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EDITORIAL NOTES—GAS, &c.

Technical Gas Commissions.

THE system of Technical Gas Commissions for reporting progress in various directions, such as the Société Technique du Gaz have established, can be made of great use if the members appointed thereon take up the work seriously, and not perfunctorily. It may be submitted that such Commissions have their disadvantages as well as their advantages. In a profession such as gas engineering, every man is the better for making for himself a survey of the ever-expanding technical and commercial gas fields, and to gather from them the corn which he, in his own practice, can put to use, or which anyway increases his knowledge of what is being done in the gas industry in the matter of opening up new paths to still greater effects. The mutations in our industry are many and great; and every change seems to broaden the scope of things. Under such circumstances, Commissions whose duty it is to watch the progress of affairs, and then prepare a compendious account of it, are highly valuable even to the close student of such matters, as what is done in the nature of report serves to remind him of the facts, and to present him with the lines of thought of, and the special features that have struck, the members of the Commission. The only possible objection to such Commissions is that they rather induce the dilatory ones to become more dilatory, through the knowledge that, if they wait awhile, they will receive in a nutshell information that would demand the expenditure of time and the exercise of some amount of diligent reading to acquire the information perhaps many months earlier. But such men ultimately find their level in the profession. The existence of the Commissions would not cause the earnest student to procrastinate in the imbibing of knowledge that awaits him by the exercise of a little personal industry. Knowledge is power; and cumulative knowledge leads and draws men to the front. However, on the whole, such Commissions watching and reporting upon technical progress are of value; and if in some cases they conduce to the destruction of individual industry in the acquiring of information, the harm will only fall upon those who make the prospective reports of the Commissions their excuse for apathy.

We commence publishing to-day the reports of the Commissions appointed by the Société Technique du Gaz; and as these are but first efforts, and an introduction to work, it may be asked that they shall not be judged harshly. It is the beginning of an effort for good; and most beneficial things in this mundane world of ours have had small, sometimes very crude beginnings. With the whole of the reports before us (for copies of which we are indebted to M. Marquisan, the President of the Society), we can see that, as the members of the Commissions settle down systematically—that is to say, if they intend the result of their labours to be real, complete, and useful—to the work of collection and digest, we shall have from them something of solid worth, with all the gems of modern information in respect of advance set out in orderly manner, and the information brought close to date. To ensure that the work shall not become irksome to the members of the Commissions by the extent of their survey, it is divided between several. One Commission deals with matters affecting coal, another with manufacture, a further one with distribution, and others with application and technical training. Such Commissions want the active assistance of their fellows in the Society. Every member should be to them a reliable reporter, when anything new or suggestive comes before him. This is so especially in the case of the Commission on Coal. That body can be of vast use to the gas industry of France; but the limits of its usefulness will be set by the amount of aid received from the whole body of the Society's members. The scope of the work that the Commission hopes to fill—the members are ambitious in their service—is a large one, and is outlined in our translation of their report. As to the Commission on Manufacture, their reports should henceforth be of greater value than the present one. As they proceed with their investigations, they will be better able to discriminate between what is not precisely new progress, and what is actual progress since their preceding report. But at the same time they have made an attempt to present in outline some of the more interesting of the modern phases of work in connection with manufacture. The Commission on gas applications are very modest; but there again, when they settle down methodically to work, they will find a vast amount of useful material from which to frame a highly instructive report. The other reports will be dealt with in future issues.

Speaking generally, some of the reports might have been even richer in information; but, on the whole, we are not—judging them as merely inceptive, and not as examples of future performances—disappointed. The system of Commissions to report upon technical gas progress is one that might be copied by other organizations, where members can be obtained who are sufficiently interested in the work to keep a sharp look-out over the period's space, to the very bounds of the subject, in order that the reports may be of actual merit and value.

Labour Contented and Discontented.

CONSIDERING the large army of labour employed by the gas industry, there is in it as little trouble between employers and workers as can be found in any line of industry. Rarely is difficulty heard of now; and, when it is, the matter is handled in a business-like way, and pacification soon enters where, under other circumstances, storm would menace. Less than a month ago, in connection with certain important gas undertakings, there were reports as to various demands; but already matters have been settled, and the bonds between employed and employers have been strengthened. The outrageous notice that was given by the Municipal Employees' Association, of the alleged refusal of the municipal unionist men in Manchester and Salford to work with non-unionists, appears to have been premature; for the men in the employ of both Corporations could not find that the non-unionists constituted a sufficiently strong *casus belli*. If other grievances can be discovered or actually exist, they are proposing to try to effect their redress by more peaceful means than throwing up their employment.

In other directions, the Gaslight and Coke Company and the Sheffield Gas Company have conceded increases of wages and other conditions, as already reported. No doubt good and sufficient reasons for this were found in the prosperity, to which the workers have contributed (more especially in the carbonizing departments), of the undertakings concerned. In the case of the Gaslight Company, the men have been dealt with in a particularly generous manner, partly through the simple means of direct communication between men and Board without unionist intermediaries, and partly by quite voluntary action by the Board. The carbonizing men, as was stated the other week have received an extra 6d. per eight-hour shift; but the Governor (Mr. Corbet Woodall) and his colleagues have gone beyond the mere question of rates of pay for service rendered. They have, as it were, penetrated into the domestic side of their men's lives by assisting them in the matter of their holidays. The co-partnership scheme has impressed the fact, which is not always present in mind through detachment from the men's private circumstances, that their holidays cause additional expense, which, if it cannot be met, means that the men and their families must spend at home the time of relief from duty. But since co-partnership was instituted, the withdrawable part of the bonus has constituted something from which the men could supplement their finances for the annual holidays; and the holidays caused a run on that part. This was just what the Board did not desire. They want the men to be co-partners in the fullest possible

reality, and to the largest extent admissible by opportunity. To save the withdrawable bonus, and increase the strength of the men's interest in the Company, it has been decided to give them double pay during the holiday week. The men have expressed their sense of gratitude; and we hope that every passing day will, by good service, deepen this feeling. We consider the action of the Board must inevitably have the effect of drawing still tighter the bonds of sympathy existing between the Company and the men. In the case of the Sheffield Gas Company, too, as we were quite satisfied would be the case, the men have been handsomely treated, and have expressed their appreciation. They are to receive an additional 3d. per eight-hour shift; and able-bodied men not specially dealt with are to have 1s. per week added to their wages. As we say, these concessions would not have been granted without the Directors saw full justification.

But the position in the gas industry stands in strange contrast with all recent happenings in the outside labour world, and with all the raucous talk that there has been at the Labour Congress and elsewhere. At the congress, there appeared to be more discord, more violent declamation, and more discontent than ever. The delegates met in an aggressive spirit; and the wake of the preceding labour wars was visible throughout the proceedings. The Government were attacked, capital was slandered, all the measures before the country conceived specially in the interests of labour were severally kicked from pillar to post on account of defects as seen by those who boast that they are the leaders in the grand march of the democracy. But the most patent thing about the congress, as also about the inquiry by the Railway Commission, is that trade unions have set their faces against conciliation and arbitration schemes. There may be a patching-up, or an attempt to rectify; but the result will only be temporary. Conciliation and arbitration are regarded as obnoxious to the principle of combination; and a more militant course of procedure accords with the tastes of the Socialistic leaders of the trade unions of to-day. "Let "us have concerted action to enforce our demands" was the top note of the congress proceedings. At the Railway Commission inquiry, it was professed that the unionists do not want strikes any more than they want conciliation and arbitration; but they do desire "recognition" of the unions, and unimpaired the right to enforce their demands by striking. And it is the aim now to abandon sectional strikes, and to have them on the superlative scale. So it has come about that a resolution was passed at the congress proposing the formation of a central body to be composed of all the various trade unions and societies for the discussion of trade union and other matters. Imagination flew from this to the question of the efficacy of a universal strike. The objective, in short, is that the world is to be brought to the feet of unionist labour, and that all the elements of humanity, save the portion that is controlled by the ultra-Socialists of the world, are to have all power crushed out of them. They are to be impotent, and subject completely to the will of trade unionism. That is the vision of certain disordered brains in the present; but visions —— well, they frequently remain in the incorporeal form.

There are, however, the non-unionists. They constitute a powerful antagonistic force to trade unionism, and its socialist and militant leaders. Their position has been robustly stated at the Railway Commission inquiry. Recognition of the trade unions is not to their liking. They have a preference for conciliation, and a yet greater preference for conference direct between Boards of Directors and the workers. Recognition of the unions, they also assert, would mean that the non-unionists would be subject to interference and intimidation, and would be compelled in self-protection to join the unions against their will. They object, too, to be ruled by bodies having extreme socialists at the head. There is sense in the non-unionist contentions; and the men's case, which was a plea for freedom from union manacles, for justice, and for protection, has not lightened the difficulties of the Commission in framing a report and recommendations that will satisfy the most discontented party to the issues under investigation.

Use of Air in Gas Manufacture.

The incandescent burner has been a valuable aid to the gas industry in more ways than that of its original purpose of increasing the volume of illumination per unit of gas expended. Had it not been for the incandescent burner, it would have been next to impossible to have made the considerable developments in the gas business in the cooking and heating fields and in industrial use that have been accomplished, and which will yet be accomplished through energy and time. The impression the burner has made upon gas manufacture and in effecting radical changes therein is incalculable—as incalculable as is the definition of the limits of its future aid in the same direction. Mr. William Key, in a paper that he read before the North British Association, visioned further ability that it places at command; but there will be a desire to know much more about his proposal than is vouchsafed in the paper. The idea of mixing gas and air in bulk prior to the point of combustion for incandescent lighting has long been among us and practised; and the fact that a considerable prior dilution of gas with air, providing there is thorough admixture, has a beneficial effect on the illuminating power of incandescent mantles has been observed by various experimentalists. The fact, also, that a fairly wide difference of calorific power has no appreciable effect upon the illuminating power of an incandescent mantle is also well known; and in this connection Mr. Key reminds of Mr. Walter Grafton's experiments, which show a lessened consumption of an air-diluted gas compared with an unadulterated low-pressure gas, with a gain of illuminating power.

Following the chain of circumstances leading up to Mr. Key's plan, air in measured quantity has long been introduced into purifiers for revivification purposes. He now goes beyond this, and suggests that all the known good advantages of the use of air with gas, and more, can be obtained by breaking down the illuminating power of high-grade gas by the introduction into the hydraulic main, in measured quantity according to requirement and under pressure, by means that he has devised, of air pure and simple, or air lightly carburetted with petrol. The proposition is an interesting one; but we wish that Mr. Key had gone farther into certain details and considerations that constitute essential knowledge in the deliberation of this matter. He has had the process in use in a small gas-works for some months; and it would have been beneficial to have had additional information as to his experiences.

We want to know more of the advantages of introducing air at the hydraulic main. Unless some economic or other benefit is to accrue from admission at this point, it would be quite unnecessary to call upon the plant and connections to deal with the part of the volume of the mixture represented by air. More knowledge is likewise required as to the corrosive effect upon plant, and as to the effect upon purification of larger and variable quantities of air than it is the present practice to introduce for revivification purposes. It has also to be remembered that lighting is not the only use of gas, and that calorific power is of importance in respect of other use. Of course, the answer to this will be that the proposition applies more especially to places where gas rich *per se* in illuminating power is produced, that the general economy and lower price will compensate, and, not only so, but the gas will be more suitable for all purposes in which an atmospheric flame is used, in consequence of the better admixture of the gas and air. But we picture a big disturbance of the conditions under which gas is utilized by adopting Mr. Key's plan. Information upon the point as to the cost of the system in working when using petrol-carburetted air would be of interest, in comparison with the cost of effecting the same objects with gas of higher calorific power produced by a carburetted water-gas plant, and at a cost to-day far below that quoted in the paper as obtaining nearly twenty years ago.

There is, further, the question as to deposition in the distribution system when petrol is used for carburetting. Mr. Key has had experience in a district of limited area; and his views as to the use of the process in connection with the gas supply of a district of extensive area would be of some value.

Suction Gas—Test and Works Conditions.

The British Association, it will have been seen from the abstract of the paper by Mr. W. A. Tookey published last week, has again been the vehicle for the dissemination of information, more or less fresh, concerning the suction-gas engine and producer. The feature of the paper is that Mr. Tookey acknowledges, with perfect candour, that there is what was once described as a *per contra* side to the economic advantages of such plants as advertised by the makers. It

was, of course, impossible that the advertised performances of these plants under test conditions could for ever keep under cover the disadvantages and the cost leakages that take place under working conditions. And so the other side of the question has now to be met. Mr. Tookey points to some of the items that have to be set against the manufacturers' claims. But he also, like a true advocate, lightens them as much as possible; and the abstracts of the paper that we have had an opportunity of perusing do not suggest that, in his summary, he compassed the whole of the working experiences that go to discount or to modify the manufacturers' statements.

On the point as to fuel, Mr. Tookey frankly agrees that test conditions are not those that obtain in everyday working, when the attendant's ability, care, negligence, and so forth, the variability of gas demand, and the diversity in the quality of the fuel, all come in for reckoning in disestablishing the claim of the manufacturers to a fuel account of under 1 lb. of anthracite per brake-horse-power-hour. It may be that the manufacturers' claims in this respect are met under conditions of working that are exceptionally favourable. But that is not the case in all circumstances; and the low figures mentioned by Mr. Tookey as having been derived from working cannot, therefore, be taken as having common application. There is a cognate point. A great fuss is made about town-gas authorities being empowered to impose a stand-by charge where suction and other producer gas is employed; and we remember Mr. William Crossley's allegation, at a former meeting of the British Association, that gas managers had threatened to "boycott" users of suction-gas plants—a thing that is impossible under the existing state of the law relating to gas supply. But this all goes to show the recognized importance of the town-gas supply to the users of suction gas plants for starting-up and for use when their producing plants are let down to clean and repair. All such utilization of town gas—imperative as it is when works' time and expenses are matters for consideration—ought to be included in the average fuel costs. There are many other losses that are unavoidable in daily working in comparison with the standard set up by the plant manufacturers' private tests under conditions that are in every respect extremely favourable to the plant. Contrasts with working results indicate that the figures published are obtained in tests made with new plant, with skilled attendants, and under full and constant loads; and the difference between the figures is one that has produced dissatisfaction.

In the matter of fuel cost, the attendant can exercise influence by the amount of care he expends; but he is hopelessly foiled by works' circumstances over which he has no control in his attempt to reach the product of tests most propitiously conditioned. As to the cost of attendance, this is one of the points that the manufacturers do not regard as of importance when talking of the financial side of the question. Mr. Tookey mentions it, and points out that this item must vary according to the conditions of every works, and we may add according to the rates of wages obtaining in various districts for men of skill and intelligence. Again the abstracts of the paper afford no satisfactory evidence as to wear and tear and renewals. The costs thereunder must vary according to the usage of the plants; and the costs will, employing in the engine a gas somewhat crude and variable in composition and quality, be of increasing amount with advancing age. Apart from the trouble with tar, suction gas has a corrosive action upon the parts of the plant and engine upon which it impinges to an extent that does not (in the case of the engines) occur with town gas, but which became evident with the introduction of suction gas. Then, again, the more repair that is needed in comparison with town gas, the greater is the time lost. Furthermore, Mr. Tookey cannot give any reliable particulars as to the consumption of water for washing the gas, for generating the water vapour in the producer, and for cooling the engine cylinders.

We do not find anything in the abstracts of the paper as to the eventual disposal of the effluent, or as to the cost of treating it, in order to dispose of it in a manner that will not be objectionable to the powers that be. On the whole, there is much left in the way of missing links to complete the chain of evidence as to the actual expense of suction-gas plants. But this we know, that between the anticipations and the realizations of the manufacturers who adopt suction-gas plants, there is a gulf that cannot be bridged under their everyday working conditions.

Specification for Street Lighting.

The coming season for technical meetings will undoubtedly see this question well to the fore; and we shall look forward to a definite report from the Committee of the Institutions of Electrical and Gas Engineers and of the Illuminating Engineering Society bearing upon the matter. Meanwhile, the extracts that we have given from the replies to the inquiries on the subject circulated by the "Illuminating Engineer" among lighting experts abroad, are, to a certain extent, valuable, but the variability of the expert opinion rather defeats the object of affording guidance. The opinions of the Photometric Committee of the Austria-Hungary Gas and Water Association [*ante*, p. 661] are particularly interesting. The Committee are of opinion that the candle power of lamps should be specified; and when a critical comparison of existing examples of street lamps is in question, the consumption of gas or electricity should also be stated. We are quite with the Committee (if we read their replies correctly) that specifications should be as free as possible from conditions that would involve laborious street testings. For instance, they consider the process of testing the minimum illumination in the streets would be a tedious one; and we can imagine the difficulties and tediousness of the work would, after a time, result in it being done in a perfunctory manner, which would be unfair to the lamps, and might possibly lead to much dispute. Where, however, measurements are made, they should be on the horizontal plane.

Other Suggestions and Difficulties.

The Committee are further of opinion that for purposes of street lighting, the mean lower hemispherical candle power should be considered, and that this should be specified in contracts. But there a very "tedious" process is being recommended, and would not be practicable for extensive testings in the streets. But it would appear that the Committee contemplate laboratory testings, as a means of checking compliance with the conditions of the contract, as they regard testings carried out in the streets as unreliable, though periodical tests for candle power and illumination there would undoubtedly be of advantage in ensuring the efficiency of lamps being maintained. But it would be quite impracticable to be constantly removing street lamps to a laboratory for checking compliance with the contract conditions; while, on the other hand, we know that lamps tested in one locality, through the unpropitious conditions of the surroundings, will give low readings, while, under the more favourable conditions of another situation, the same lamps will, without any other change, give higher readings. Under the former circumstances, if the lamp renders the required actual candle power under standard conditions such as obtain in the laboratory, it would be unfair for it to be the subject of penalty through the detrimental effects of external conditions. The whole subject is beset with much difficulty.

Hot Water Supply.

The controversy continues in "The Times" on the subject of domestic hot-water supply. Mr. R. Herzfeld appears to have a predilection for hot-water supply distribution from a central station, which blinds him to any merit in any other system of obtaining hot water in the household. He does not see any particular good in the information given by Mr. Frederick Dye as to the independent provision, by means of a gas-boiler, of a supply of hot water as required in a dwelling. He does concede that, if "the present difficulties as regards the safety of such apparatus are overcome, the proposal is certainly a step, although only a timid one, in the right direction." The point as to safety is evolved from the imagination of an advocate of another system. But we proceed. "Apart from the susceptibility of automatic regulating devices, the cost per 100 gallons, including interest, depreciation, repairs, and so on, looks prohibitive." That is vague. To us, it seems, the very same words may be applied, *a fortiori*, to a distributed hot-water supply from a central station, besides which there would be unavoidably serious thermal losses, and the consumer would have no control over the temperature of the supply. It is true we satisfy most of our daily requirements by supply from outside our dwelling-places; but hot water is a requirement that can be better and more economically satisfied from within. Mr. Herzfeld's system would be costly, even if effective in service. That it would be effective is problematical; that there would be much loss and waste is certain. Water heating by gas is not a thing to be summarily dismissed to-day.

ROBERT MORTON.

THOUGH he had passed, by some years, the allotted span of three score years and ten, the news of the death of Robert Morton comes to us with a suddenness that causes a depression of spirits, and a feeling that a fresh gap has been made in our lives and in personal friendship that it will be hard, we may say impossible, to fill. His death breaks an uninterrupted connection, through the gas industry, from our youth up; and as we stand and peer through that long vista of time during which his name and person have been with us as gas engineer and administrator and friend, the journey—long as the vista is—now appears at the close of his life to have been remarkably rapid. We mourn his loss. We regret profoundly that we shall not gaze again upon those strong, rugged, yet benevolent features—usually, in latter years, grave, but through which gravity the kindly nature penetrated.

There are few men such as Robert Morton has been. He was not conspicuous in public ways—his reserved nature would not allow him to be. But somehow one ever felt, and one could not exactly say why, that he was a tower of strength, and always induced confidence. As an engineer, his advice was sound; and as a manager and administrator, those who knew him set a high valuation upon his tact, judgment, and comprehensive grasp of affairs. He was a strong man in all these things, and was not conservative. There was not about him as a gas administrator any bias the product of early practice and method; but to the last, his mind was ever receptive of necessary changes and advances, with a quick appreciation of opportunity. He was a progressive by nature; and he would always rather let his own individuality and ideas stand aside rather than allow any concern or proposed development to suffer by attempting to insist on the acceptance of any view that he appreciated might be defective through his detachment from official activity. He was not a man of many words; but his words crystallized extensive thought, and that one felt as he spoke. The voice, with its Scotch accent, is now silent. The native caution, which was as a brake to a progressive inclination—so making for mature consideration, and giving just the requisite steadying force to more impulsive natures with whom he might be working—is a characteristic of which many of his colleagues have acknowledged the value.

We will not say anything further in this little appreciation of his personal traits, except that those who knew him best will miss him most; and to those who knew him best, our and our readers' sympathies go out mingled with the deepest sorrow.

Death has removed—to the sorrow of a large circle of friends in the gas industry—in the person of Mr. Robert Morton, a man who was closely connected with the earlier history of the gas supply of London. While staying at the Bournemouth Hydro to recruit his health, Mr. Morton was taken ill with pleurisy; and on Thursday the doctor in attendance on him advised that the following day he should be removed to a nursing home. During the Thursday night, however, he passed quietly away; the immediate cause of death being heart failure. Those who saw him at the recent opening of the Livesey Memorial Hall, realized that his strength was failing him; but none thought the end so near. The funeral took place at Bournemouth yesterday morning.

Mr. Morton, who at the time of his death was in his 77th year, served his apprenticeship, we believe, with Messrs. H. Balfour and Co., of Leven, and acted as their representative in various parts of the country, until his appointment as Engineer of the Woolwich Gas-Works. From Woolwich he went to the Vauxhall works, then belonging to the Phœnix Gas Company, of which he became Superintendent, in succession to Mr. Douglas. On the retirement of Mr. David Watson, Mr. Morton was appointed to succeed him as Engineer to the late London Gaslight Company, who had works at Nine Elms and Vauxhall; the latter works being abandoned some few years afterwards. On the amalgamation of the London Company with the Gaslight and Coke Company, Mr. Morton retired, and was succeeded by Mr. John Methven, who had been acting as his assistant in succession to Mr. Charles Hunt when the latter gentleman went to Birmingham. At Woolwich, Mr. Morton had for a pupil Mr. Corbet Woodall, who left him to become Manager at Stockton-on-Tees, and succeeded him as Superintendent of the Phœnix Gas-Works, Vauxhall. Mr. Hunt was an assistant at Nine Elms when Mr. Morton became Engineer; he having been appointed assistant to Mr. David Watson in 1866. Mr. Morton's appointment dated from about 1868; and Mr. Hunt remained with him until 1872. During this time, Mr. Morton had a pupil named White, who afterwards became Engineer to his old works at Woolwich, and remained so until the works were bought by the South Metropolitan Gas Company. Then there was Mr. John Methven, who had only been a short time in Birmingham when Mr. Hunt went there, and left that town to succeed Mr. Hunt at Nine Elms. The late Mr. Alfred Colson (of whom Mr. Morton always entertained a high opinion) was Clerk of Works over the then new gasholder station at Battersea for a year or two before joining Mr. Hunt in Birmingham. Mr. Alex. Wilson, of Glasgow, was foreman at Nine Elms after Mr. Hunt's time, and left to become Station Manager under Mr. Foulis. Mr. Robert Johnston (the father of Mr. A. A. Johnston, Engineer to the Brentford Gas Company) also served under Mr. Morton at Nine Elms.

After his retirement from active gas-works management, Mr. Morton was still able to turn his knowledge and experience of the industry to good account, by joining the Boards of several undertakings. He became a Director of the South Metropolitan Gas Company in 1886; of the Monte Video Gas Company, in 1887; of the Hong Kong and China Gas Company, in 1897; and of the South Suburban Gas Company, in 1899. In the welfare of all these Companies he took a keen interest up till the last. On the death of Sir George Livesey, Mr. Morton temporarily occupied the chair of the South Metropolitan Company, pending the time when a definite decision could be come to in the matters of the new Director and the future Chairmanship. In 1872, Mr. Morton was admitted as a member of the Institution of Civil Engineers; and in 1876 he filled the position of President of the British Association of Gas Managers.

The working man always had a friend in Mr. Morton; and his successful effort (in conjunction with the late Sir George Livesey, always a close friend of his) to arouse widespread interest in the question of the abolition of Sunday labour in gas-works is a case in point. As long ago as 1870 he read a short paper on the subject before the British Association of Gas Managers, the result of which was that the matter was referred to a Committee (to whom the question of the propriety of forming a Benevolent Fund in connection with the Association had also been remitted), with instructions to make inquiries and report to the next meeting. Of this Committee, Mr. (afterwards Sir) George Livesey was Chairman.

An Appreciation, by "C. H."

Mr. Morton's influence for good was scarcely less than that of his life-long friend, the late Sir George Livesey, though less apparent to the public eye. Sir George found in him a staunch, sympathetic, and withal judicious, fellow-worker. No two men could be more unlike in some respects than these were; and perhaps for this very reason they were united to each other. Mr. Morton's sound judgment and shrewd common sense were greatly valued by Sir George, whose entire confidence he possessed.

A reputation for sternness preceded him at Nine Elms; but this proved to be but the firmness by which order is brought out of chaos; and there were those who had reason to be thankful for having been brought under his influence. In reality, a somewhat uncompromising exterior covered one of the kindest of hearts; and, while inflexibly just, he knew at the same time when and how to be merciful. He was sparing of words, but had the rare gift of being able to say the right thing at the right moment; and his plainness of speech not seldom meant confusion to those who were unaware of the power which was held habitually in reserve. As an instance of this, may be mentioned his memorable encounter with the late Cardinal Manning, which occurred in connection with the first Dockers' strike fully twenty years ago. At the end of an abortive conference respecting the wages of the waterside coal men, at which Sir George (then Mr.) Livesey and he represented the South Metropolitan Company, the Cardinal, pointing with his finger to Sir George, said, "I have heard of you, Sir, and now I have seen you; and I tell you that you are the cause of all this trouble." Whereupon Mr. Morton promptly took up the cudgels; told the Cardinal that he did not know what he was talking about; and with a very few more words effectually silenced him.

Having gone "through the mill" himself, no one knew better than Mr. Morton did the conditions under which work has to be performed; and he was in every sense of the word a true friend of the working man. His voice was always raised in favour of dealing liberally with employees of every grade.

OBITUARY.

The death has occurred, at the age of 89, of Mr. JAMES GOODWIN, who was for thirty years connected with the Rotherham Gas-Works, and during the latter part of the time acted as Manager. He retired on a pension from the service of the Corporation in the year 1892.

The South Shields Gas Company have lost another member of their Board of Directors. After a short week's illness, Mr. WILLIAM BELL READHEAD died at South Shields last Friday morning. His illness came on suddenly. He was present at the funeral of the late Dr. Armstrong at Harton Churchyard the previous Friday, attending as one of the Directors of the South Shields Gas Company, but at that time he complained of being unwell. Subsequently he was found to be suffering from appendicitis, with peritonitis supervening. The deceased gentleman, who was fifty years old, was the fifth son of the late Alderman John Readhead, the founder of the firm of Messrs. John Readhead and Sons, West Docks, South Shields.

The industry has lost an earnest worker in connection with the automatic lighting and extinguishing of gas-lamps by the death of Mr. GEORGE ROBSON, which took place last Saturday week, at his residence in Clarence Gate Gardens, Regent's Park. After spending twenty years in Australia, he returned to this country in May, 1908. Some five years ago, he patented a street-lamp controller; and since then his name has become widely known as that of the inventor of the "Automaton" system. Mr. Robson took a keen interest in this subject, with which he was eminently fitted to deal; and as the result of his investigations, he was led to pin

his faith absolutely to a mechanical (clockwork) device operated by pressure waves. His patents were taken over by Auto-Lighter, Limited, of Victoria Street, S.W. While in Australia, Mr. Robson was connected with the mining industry, and was Chairman of many Mining Associations, &c. He lived at Coogee, Sydney. Last year he joined the Evening Star Masonic Lodge.

The death is announced, as having taken place on the 7th inst., of Mr. G. N. ARCULUS (aged 57), a partner in the firm of Alfred Arculus and Co., of Birmingham. The firm have always made a specialty of high-class glassware for lighting purposes, and were among the first to take up the manufacture of incandescent gas-globes. Their interest in this trade led them to experiment in the manufacture of burners; and eventually they produced the "Etna" incandescent burner, the success of which was such that the Etna Lighting and Heating Company, Limited, was formed to work it.

PERSONAL.

PRESENTATION TO MR. W. E. PRICE.

IT is a pleasure to be able to record that Mr. W. E. Price, who has just completed twenty-five years' work as Engineer and Manager of the Hampton Court Gas Company, has had the gratification of being presented by the Directors of the Company with a gold watch, a cheque, and an illuminated address in commemoration of the event, and in appreciation of his services. Though it is a long period, the twenty-five years referred to does not embrace the whole time during which Mr. Price has been connected with the undertaking. He joined the Company about the year 1877; and it was in 1886 that he was appointed Engineer and Manager to succeed his father, Mr. E. Price, who retired then (and is still, we are glad to know, in good health), after serving the Company for thirty-five years. As has already been announced, the employees and staff of the Company presented Mr. and Mrs. W. E. Price with a silver salver and an album with the names of all the subscribers inserted, in celebration of their silver wedding, which occurred in June last. Mr. W. E. Price, it will be remembered, was President of the Southern District Association of Gas Engineers and Managers in 1902; while he at the present time occupies the position of Hon. Secretary. He is also the Chairman of the Commercial Section of the Association, and was instrumental in bringing before a Conference of Commercial Sections the pressing need of a "Publicity Campaign."

A copy of the August issue of a Japanese monthly, "The Musashino," to hand contains the announcement of the marriage, on July 20, of Mr. SHIGEYOSHI SUZUKI, of the Tokyo Gas Company, to Miss Kishi. The marriage was solemnized at the Daijingu Shrine at Hibiya. A dinner and reception were given at the Imperial Hotel, Tokyo, in celebration of the event.

The post of junior assistant to Mr. R. Nelson at the East Hull Gas-Works (advertised in the "JOURNAL" of the 5th inst.) has been filled by the appointment of Mr. SYDNEY HOLE, of Leeds. Mr. Hole has been trained at the Leeds Gas-Works under the Chief Chemist, Mr. A. Edwards, and holds a first-class "Honours" certificate in "Gas Engineering." He is the eldest son of Mr. Walter Hole, of Leeds.

At the last meeting of the Windsor Town Council, reference was made by Alderman Clarke to the retirement of Mr. C. SAINTY, the Water-Works Manager, after many years' service in connection with the Corporation. He said he was sure it was the wish of every member of the Council that Mr. Sainty might be spared many years to look back upon the times when he had tried, if any man had, to do his duty. He moved the following resolution, which was carried: "That the best thanks of the Council be given to Mr. Sainty for his long services and for the loyal and steadfast way in which he has carried out his work." Mr. Sainty returned thanks.

The annual outing, at Bournemouth, of the staff and employees of the South Hants Water-Works Company was made the occasion for some interesting presentations. Mr. GEORGE GREENSLADE, the retiring Manager, was handed, on behalf of the employees, a beautifully executed illuminated address, which read as follows: "We, the employees of the South Hants Water-Works Company, learn with deep regret of your decision to resign the position of Manager after 32 years' strenuous and faithful service to the Company. We heartily unite in offering you the accompanying gift as a small expression of our esteem, and in recognition of the many acts of kindness and goodwill which you have shown to one and all under your charge. While regretting the severance of the happy relationship which has always existed between us as manager and workers, our best wishes follow you in your retirement, and we express the hope that you may be spared many years to enjoy your well-earned rest." Mr. Greenslade, in responding, said he had received a very handsome silver salver with the names of the Directors inscribed on it. Though he ceased to be an official of the Company, he hoped to be spared many years to enjoy their friendship. A silver butter-dish and cruet were subsequently, on behalf of the employees, handed to Mr. W. G. Greenslade, the son of the retiring Manager, on the occasion of his marriage. This was suitably acknowledged; and the health of the new Manager (Mr. Dawson Kitchingman) was then drunk.

ELECTRICITY SUPPLY MEMORANDA.

Where Travellers Sleep—Wood Casing and Electric Wiring in Hotels—The Immovable Caterers—"Ignoramus!"—Secret of the Success of High-Pressure Gas-Lamps—The "Electrician's" Erratic Moods—A Nasty Collapse.

THERE is anguish among electrical folks in the Metropolis; and our friends of the Electrical Press are sharing in it. It has been announced—and it is looked upon as an "alarming suggestion" that the Building Committee of the London County Council are considering the question of promulgating an edict to the effect that electric wiring in all buildings where hotel or sleeping accommodation is provided for the public shall be encased throughout in steel tubing. The reason that this matter is under consideration is that the Building Committee know that "several of the recent big fires in the Metropolis were caused by badly insulated electric wires." The County Council Committee are told by the Electrical Press that there is absolutely no evidence to support the statement. Perhaps there is not in the offices of the electrical papers referred to; and if there were, it might be—we repeat "might be"—conveniently forgotten. But the County Council have the London Fire Brigade under their charge; and there may be evidence in that quarter which has not come within the ken of the electrical papers. However, they are very angry over the matter; so angry that the "Electrical Review" as good as tell the County Council that steel casing has been as great a culprit as wood casing in association with fire-raising. The "Review" might have kept that to themselves. This is what it very undiplomatically says: "There are numerous buildings of every size and description which were wired twenty or more years ago in wood casing, and in which the installation is to-day in irreproachable condition; while any contractor or consulting engineer can point to cases where steel tubing put in but few years ago has failed disastrously." The reason given is bad workmanship, despite rules and regulations by the hundred, and Fire Office inspections. Those buildings that are electric wired in wood casing, and have escaped, have something for which to be thankful; those that have not escaped have something to deplore. It is not altogether a question of wood or steel casing or bad or good workmanship, whether or not fires occur. There is something else, and electricians know it. Fires have occurred in places in which there has been a thorough inspection of the wiring, and no defect has been traced; and the fires have not occurred immediately installation has been made. However, it is considered that any compulsory encasing in steel tubing would be a costly affair for hotels and all other places in which sleeping accommodation is provided for travellers. But if there is superior virtue in steel tubing in contrast with wood casing, then the public ought to have the protection, no matter the cost. Like the thief who comes in the night, so these electrically generated fires frequently occur when the world is asleep; and just as no one knows the day or the hour when the thief is coming, so no one knows the day or the hour when these fires are going to occur. It is in their insidious character that their greatest danger lies. The "Electrical Review" in connection with the proposal refers to the "tyrrany" [*sic*] of "self-government." That must be something terrible.

Another matter over which the great part of the electrical industry represented in the person of Mr. A. Hugh Seabrook is fearfully pained is that the caterers at the forthcoming Electric Exhibition at Olympia will not use electricity, but will adhere to gas. Mr. Seabrook has been urging that pressure should be brought to bear upon the caterers to get them to adopt electric cooking; but the caterers refuse to commit themselves, and their business, to the suggested uncertainty and uneconomy. This display of interest on the part of the caterers in the preservation of their reputation is painful to Mr. Seabrook, because it proves to the public that the largest caterers in London (Messrs. Lyons and Co.), who naturally follow very closely all matters appertaining to their business, are not converts to the use of electricity in the kitchen. We charged Mr. Seabrook the other week with some loose and absurd statements anent gas cooking, as well as about tainted food. We pointed out that Mr. Seabrook and certain members of the staff of the "Electrical Review" have frequently to our knowledge partaken heartily of gas-cooked food, without complaint as to "taint." All which is testimony to the absurdity of Mr. Seabrook's flabby assertions. The same character of looseness apparently applies to his exertions in the "Review" to get the caterers at Olympia to change from gas to electricity for cooking. In one letter, he remarked: "I say *emphatically* that proper steps were not taken to induce them to use electricity. . . . The attitude of the Executive Committee was feebleness itself when Mr. Cottam raised the question at a meeting of the Honorary Advisory Committee some months ago." Mr. Seabrook has since withdrawn his emphatic and ill-founded statement, and in a manner which shows the extent of the defect in his knowledge. He has since been informed as to the steps that were taken, "which probably were not so active as they would have been had the Committee been composed of electric cooking manufacturers only, and were not the steps referred to in my letter; but *undoubtedly a strong line was taken*, with, unfortunately, no success. So the Committee are entitled to my withdrawal of my criticism of their action." How very nice and condescending of Mr. Seabrook. But why did he not get a little nearer the truth before saying "emphatically" that proper steps were not taken to induce

the caterers to use electricity? The fact that "a strong line was taken," but without success, is the clearest possible testimony as to the present views of Messrs. Lyons and Co. on the subject of electricity as an agent in culinary operations.

"Ignoramus" has written an article in the "Electrical Engineer" on that subject of perennial interest, showrooms. He justifies the title he selected for himself by more points than one. Nearly all he says has been said by others before him. Towards the end, however, he gives to gas authorities the palm for the enterprise they display in their showrooms. He thinks the success of gas undertakings is well deserved—apparently only on account of their methods of advertising, and not on any other ground. We see this from what follows: "Of course, gas must ultimately give way to electricity, because of the inherent good qualities of the latter, which no mismanagement can effect. But meanwhile gas engineers, handicapped as they are with a filthy illuminant, have earned our sincerest admiration by the way in which they have staved off the (to them) evil day." The ideas of "Ignoramus" do not find expression in the Board of Trade returns, relating to gas undertakings, nor in the recently published Census of Production return, in which information is supplied regarding both gas and electricity concerns. But although, taking him at his own valuation, the dictionary would describe the writer of the article as ignorant, a blockhead, and a stupid, he might be courteous, and refrain from such descriptive terms as "filthy." However, the differences in the showrooms of gas and electricity undertakings are not to his liking; but he finds one excuse in the fact that "we [that is electricity folks] are on the winning side, and we know it." Knowing this, he counsels electricity undertakings to—instead of merely allowing electricity to slowly win its way purely on its merits—oust gas from its position of nearly universal popularity by extensive advertising, "regardless of cost." And this after all the advertising literature from electrical undertakings that we have seen, and the thousands upon thousands of pounds spent annually upon publicity (of a more or less honest character) by the electrical industry. It is a big business that it is lightly suggested shall be ousted promptly, "regardless of cost." "Ignoramus!" The poor fellow is partly backed up by a new venture of the same paper which gave space to his effusion. This new venture is in the form of a monthly supplement, to be known as the "Electrical Manufacturer and Installation Engineer." In the introductory lines of the first issue, we read: "The electric light is now installed as a matter of course into [*sic*] even small cottages; gas-lighted shops are comparatively rare." Perhaps the writers of the article and of the introduction to the supplement are one and the same person. If they are not, the latter is entitled so far as we have quoted from him to the same appellation, "Ignoramus!"

We have found the reason why high-pressure gas is "ousting" electric arc lamps—flame and otherwise—from the outsides of shops. The secret leaks out in an article by "Dumb Friend" (who if dumb makes an excellent windy showing in print) in the "Electrical Review." The article censures the formalism of municipal committees, and taunts the members with assuming the possession of knowledge that (so they think) justifies them in usurping the technical control of the engineer. A concrete illustration is given; and it is this that throws light on the cause of the success of high-pressure lighting. It is quite simple, and has nothing to do with economy, efficiency, or any other merit. This is what we learn: The gas companies recently tried, with a large amount of success, to obtain the universal adoption of high-pressure gas for outside lighting. The prices charged by them for supply and maintenance are "ridiculously" low—in fact, much lower than the present rates for flame arc lamps. Handicapped by the lack of privilege to experiment with the ratepayers' money, the electrical engineer has to evolve theoretical [? theatrical] schemes to endeavour to out-do his rivals. A reduction in the price of current for outside lighting is, of course, his ultimate aim; but this is not the sort of thing that the Lighting Committee will agree to without some weeks of discussion. Finally, when they are really persuaded that the engineer has advised them well, it is too late; for the gas company have not been idle, and the high-pressure gas is installed from one end of the street to the other. In novelette style, the statement proceeds: "Heartbroken, the engineer hunts for another idea which will, no doubt in time—perhaps a long time—be sanctioned by the Lighting Committee and put into operation. But again too late; the private company is once more in front of him." Of course, we need not accept the explanation as true. Knowing what we do, the inclination of our belief as to the real causes for the success of high-pressure gas lighting is quite in another direction.

Competition is undoubtedly one of the best safeguards that the purchaser has; but the "Electrician" in discussing some of the effects of competition informs its readers that it is now recognized that competition without compromise is neither in the interest of buyer nor seller, of consumer nor producer. A case in point is found in the cessation of cut-throat rivalry between the various agencies competing for the traffic of London, and another is seen in the similar policy of the railway companies. Our contemporary cannot use as further examples the conditions existing in the electrical manufacturing industry, nor those obtaining among the electrical journals. There is, however, the Holborn affair that might have been quoted, but was not. Then it goes on to tell its readers of the very commonplace and well-known fact that there has been some acute and very bitter controversy between electrical and gas engineers, adding: "We hope we have at no time done anything to embitter the relations between us and them; they have undoubtedly as much right to conduct their business in their own way as we have to conduct ours." Well said; but is it all true? We remember that the "Electrician" has said things that were somewhat rancorous about street lighting contracts; we know, too, of statements inferring oblique or unfair methods on the part of a gas company or gas companies who had secured certain of the contracts. We recollect further that an attempt was made to get the "Electrician" to commit itself to a categorical statement of an instance of what they alleged. But the endeavour was futile. The allegation was carefully left unsupported; and perhaps our contemporary in its own interests and for its own peace of mind was wise. Yet it now in sublimely innocent words says: "We hope we have at no time done anything to embitter the relations between us and them." There must have been a large amount of tongue in the cheek when those words were written.

But the "Electrician" is apt to be somewhat erratic. In the issue succeeding the one in which the statement referred to above appears, an invitation is magnanimously issued to gas consumers generally, and to ourselves in particular, to visit the forthcoming Electric Exhibition at Olympia. So far as we are concerned, the invitation was unnecessary. But in tendering it, our contemporary says that the "JOURNAL" "has lately been worried about certain facts regarding the 'Tricity' cooker, and, instead of applying direct to the makers of this effective and efficient device, asked an explanation of us." Now what is the use of making misstatements of this kind? On July 25, we asked the Berry Construction Company to reply to certain points. Failing that Company, on Aug. 15, we suggested that perhaps the "Electrician" would oblige. On Aug. 29 (p. 539) we quoted our contemporary's "weak evasion." Where is the justification for our contemporary's present assertion?

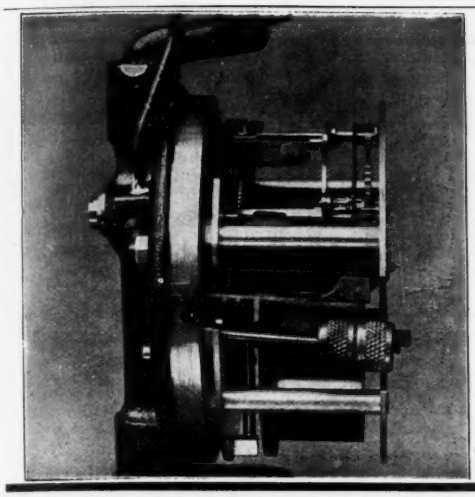
According to electric theory and literature, electric wires do not fuse and cause fires and large extinctions; in practice, they do. The Blackwall Tunnel—a nasty place for such a thing to occur—experienced the fusing of an electric wire last Tuesday night; and the convenient thoroughfare was "plunged" in darkness. It was a wonder there was not a serious panic, seeing that the collapse occurred soon after seven o'clock, when (we cannot vouch for the accuracy of reporters' estimates) "thousands" of workers were passing through the tunnel, and had to grope their way along until they reached the other end. The police found it necessary to close the tunnel to vehicular and pedestrian traffic, as the fusion was so extensive that it was impossible to effect repairs that evening so as to restore the lights. The result was that for the remainder of the evening the convenience of Blackwall Tunnel had to be denied to the public. This would not have happened had the illuminant been gas with (they would be most suitable for this position) inverted incandescent burners. Gas-pipes are not in the habit of fusing.

Scottish Junior Gas Association—Western District.

The Hon. Secretary and Treasurer of this Association (Mr. D. Fulton, of Dawsholm) has prepared the syllabus of business to be undertaken by the Western District during the coming winter. It is as follows: Oct. 7. Opening address by the President (Mr. James M'Ghee, of Glasgow), and address by Mr. W. Carmichael Peebles, of Edinburgh, on "Governors." Oct. 21. Visit to the Helensburgh Gas-Works. Nov. 4. A paper by Mr. J. Grant, of Glasgow, on "Prepayment Meters." Nov. 18. Visit to the Barrowfield Iron-Works. Dec. 2. A paper on "Electricity in a Gas-Works," by Mr. J. Wilson, of Falkirk, and a short address by Mr. W. B. M'Lusky, of Perth. Dec. 16. Annual Social. Jan 13. Coffee Meeting. Jan. 27. Visit to the Kirkintilloch Gas-Works, and a paper on the Kirkintilloch Boosting Plant, by Mr. J. Bell, of Kirkintilloch. Feb. 10. A paper by Mr. Watson M. Cowie, of Locherbie, on "Experiences of a Manager in a Small Gas-Works." Feb. 24. Visit to the Hamilton Gas-Works. March 9. A paper on "Some Notes on a Scheme of Reconstruction," by Mr. R. D. Robertson, of Airdrie. March 30. Joint visit to the Alloa Gas-Works. April 13. Annual general meeting, and lecture by Mr. A. Wilson, of Glasgow.

A Knighthood for Mr. Askwith.—The King has conferred upon Mr. G. R. Askwith the honour of knighthood, and invested him with the Insignia of a Knight Commander of the Order of the Bath (Civil Division). Mr. Askwith's name is well known in connection with his position as Comptroller-General of the Commercial, Labour, and Statistical Departments of the Board of Trade; and he has frequently rendered excellent service in the settlement of industrial disputes.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.—We are informed by Mr. Octavius Thomas, the Hon. Secretary, that a meeting of the Institution will be held at the Bush Hotel, Merthyr Tydfil, on Wednesday of next week. In addition to the formal business, there will be the Presidential Address of Mr. E. H. Swain, of Pontypridd; and a paper by Mr. J. E. Kenshole, on "The Merthyr Gas Company and their Works." After luncheon (at which the Chairman and Directors of the Merthyr Gas Company will be the hosts), the members will visit the gas-works, under the guidance of Mr. Kenshole, the Engineer and Manager.



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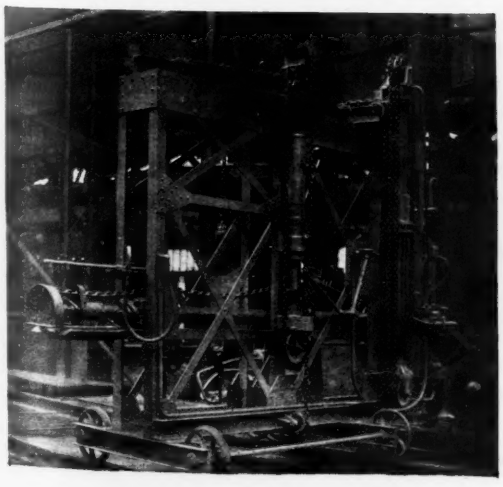

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GLASGOW AND HIGH-PRESSURE LIGHTING.

Visits of the Deputation of the Corporation to Inspect the Installations in London and the Crystal Palace.

A DEPUTATION of the Glasgow Corporation arrived in London on Saturday afternoon to inspect the high-pressure gas lighting in the streets of the City of London. The deputation consisted of Bailies Paxton and Kirkland, the Convener and Sub-Convener of the Gas Committee, Councillor Pratt, the Convener of the Lighting Committee, Councillor R. S. Brown, Convener of the Watching Committee, and Councillors James Stewart (Bromielaw Ward), James Stewart (Townhead Ward), accompanied by their Gas Engineer (Mr. Alexander Wilson, M.Inst.C.E., Immediate Past-President of the Institution of Gas Engineers), Mr. S. B. Langlands, the Lighting Inspector, and Mr. J. J. Cairns, of the Town Clerk's Department.

The deputation arrived in London at four p.m., and were received, on behalf of the Corporation of London, in the absence of the Chairman of the Streets Committee, by Mr. Deputy C. Morton, M.P. The first proceeding was to visit the Crystal Palace, to inspect the high-pressure lighting on the Keith system, installed by the South Suburban Gas Company. The deputation was received by Mr. J. W. Whimster and Mr. H. Baldry, on behalf of Mr. S. Y. Shoubridge, the Engineer and Manager of the Company, who conducted the party through the grounds, &c., and explained the lighting.

Yesterday (Monday) morning, the deputation visited the Guildhall, and were received at the Public Health Department by Deputy Morton and the officials, when matters concerning the high-pressure lighting of the City were discussed.

In the evening, after dinner at the Royal Hotel, the deputation, accompanied by Mr. Morton (who is Past-Chairman of the Streets Committee), Mr. J. W. Domoney, Deputy Matthew Wallace, Mr. Jacques Abady, Mr. Frank Sumner (City Engineer), Mr. F. W. Goodenough (representing the Gaslight and Coke Company), Mr. W. Doig-Gibb (the Engineer of the South Metropolitan Gas Company), and Mr. W. J. Liberty (the City Lighting Inspector), commenced their inspection of the streets and the bridges of the City. These include Blackfriars, Southwark, and London bridges, all of which have been lighted with high-pressure gas during the last ten years. Particular interest was taken in the new installation of the centrally-hung high-pressure inverted gas-lamps in Cannon Street, where the system was explained, and the lamps raised and lowered from the centre of the roadway to the pavement level, and *vice versâ*, while the lamps were in lighting. On leaving the City, the deputation, under the guidance of Mr. F. W. Goodenough and Mr. Jacques Abady (the Chairman of the Works Committee of the City of Westminster), made a tour of the City of Westminster to inspect the new high and low pressure gas-lamps recently erected under the Westminster contract.

The deputation leave London to-day (Tuesday) for Birmingham, to inspect the lighting there.

On Thursday, the deputation leave London for Berlin, for the purpose of inspecting the magnificent system of high-pressure gas lighting in that city.

Inspection at Manchester.

On their way to London, the deputation visited Manchester, on Friday, to inspect the lighting there. They were received by Mr. W. Kay, the Deputy Chairman of the Gas Committee, in the absence of the Chairman (Alderman R. Gibson), Alderman Birkbeck, Alderman Harrop, and Councillor J. R. Smith. In their inspection during the evening of the streets now illuminated by the high-pressure system, the party were accompanied by Mr. J. G. Newbigging, the Chief Gas Engineer to the Corporation, Mr. Frederick Price, Superintendent of the Gas Department, and Mr. J. R. Brocklebank, Superintendent of Street Mains and Lighting.

As stated in previous issues of the "JOURNAL," the Manchester Corporation have now in use in the centre of the city 60 high-pressure lamps of 1500-candle power, and a further extension of the system to Oldham Street is about to be carried out, at the request of the tradesmen in the thoroughfare. Of the 22 lamps on the Piccadilly area, one is of 3000-candle power; and since the installation of the new system, the public have been much impressed by the steady, white light of the lamps, coupled with their great diffusive power. The many inquiries the Gas Department officials have received from business houses and tradesmen in the city indicate a still further extension of the system for the lighting up of business premises. The present plant of the Corporation, with the two compressors, is capable of meeting an extension up to 400 lamps of 1500-candle power.

St. Cuthbert's Church, Kensington, was the scene of the wedding, on Saturday, the 9th inst., of Mr. W. H. Bennett, the Engineer and Manager of the Redhill Gas Company, the eldest son of Mr. and Mrs. C. V. Bennett, of Herne Bay. The bride was Miss Frances Cox Smale, daughter of Mr. and Mrs. Smale, of Ystrad Hall, Llandovery. Subsequently a reception was held at the Royal Palace Hotel, Kensington. Among the presents (some eighty in number) was a handsome dining-room clock from the Directors of the Redhill Gas Company, and a spirit tantalus from the Company's employees.

FRENCH COMMISSIONS' REPORTS.

IT is only a short time ago that the Société Technique du Gaz struck out a new line in appointing permanent Commissions, or special Committees, to collect, consider, and report upon information and facts relating to different departments of the gas industry. There were five of such divisions to deal respectively with the principal branches of gas interests—viz., coal analysis, manufacture, distribution, application, and technical training. Though time, of course, has not as yet allowed of anything very definite being done, the reports of these Commissions (which we recently received through the courtesy of M. Marquisan, the President of the Société Technique, and which were presented to, but not read at, the recent annual meeting of the Society) show that a good deal of preliminary work has been got through. The outlines of the Commissions' fields of labour have been mapped out, and preparations made for collecting, digesting, and disseminating the technical matter relating to their different spheres of activity.

COMMISSION ON COAL ANALYSIS.

This preparatory work particularly appears in the report of the Commission on Coal Analysis. It was only formed last winter, and has met a few times with a view to defining its programme, and of ascertaining both its immediate and future objects. Without pretending to lay down any dogmatic official theory, it will direct its labours towards the following goals—

(*a*) To define as clearly as possible the qualities of different gas coals, and methods of analysis applicable to them.
(*b*) To supply gas-works with useful hints and practical means of controlling deliveries of coal.
(*c*) To place at the disposal of gas-works a collective technical organization, either specially formed or by utilizing what already exists, to afford as accurate analyses as necessary, and to make tests on coal under working conditions. Such organization would be able to keep gas-works subscribing to it in touch with its work by periodical confidential notes.
(*d*) To establish a standard specification for the purchase of coals.

Some information has already been collected on these various points; but a number of members could give valuable help to the Commission by communicating useful facts, which they may have in their possession, upon the following and other questions—

1. Purchase of gas coals; data concerning purchase agreements; reservations or rebates in anticipation of possible defaults—such as excess of moisture or ash; copies of existing contracts.
2. Carriage of coal; capacity of waggons; liming, tarpaulins, discharging arrangements from boats.
3. Storing and screening.
4. Keeping in store, and precautions against spontaneous combustion.
5. Causes of deterioration of coal in store, and the best precautions against it.
6. Taking of samples for analysis.
7. Measurement in the works or laboratory of the amount of moisture and ash.
8. What is practically required from tests of samples?
9. Commercial analysis of gas coals; management of crucible and distillation tests.
10. Calorific power of coals, with bomb or otherwise.
11. Methods to facilitate complete or partial analysis of coals in all works, and the superintendence of the carrying out of contracts by the collieries.

To the Commission it appears that both the most important and the most difficult part of its work is the realization of the collective technical organization referred to in paragraph (*c*). Its only chance of success lies in the direct communication to it of ideas on the part of the largest as well as the smallest gas companies. Analogous efforts have been made abroad—as seen in the Association of Swiss Gas-Works for the purchase of coal, the Federal Swiss Laboratory for the test of fuel at Zürich, the Technical Instruction Institute at Carlsruhe and the Experimental Works and Laboratory of Dr. H. Bunte and Dr. K. Bunte. The assistance both of gas companies and of individual engineers is required if successful results are to be achieved. Only by willing co-operation will equitable clauses in coal contracts and their observance in carrying them out be attained.

The report concludes with a list of papers and documents collected by the Commission.

COMMISSION ON MANUFACTURE.

Perhaps more interest will attach to the report of the Commission on Manufacture of Gas, which embodies a review of improvements effected in manufacture during the previous year. As the report says, however, nothing of sensational novelty is revealed.

As regards carbonization, the examination of the new methods of distillation continues, and figures are published from time to time on the working of the intermittent vertical retort (Bueb), the continuous (Woodall-Duckham and Glover-West), and horizontal or inclined retort-chambers. Unfortunately, the papers

published often lose part of their documentary value, owing to lack of sufficient preciseness as to the conditions under which the results were obtained. For example, in a paper ["JOURNAL," Vol. CX., p. 167] by Dr. R. Geipert in the "Journal für Gasbeleuchtung" (April 16, 1910), recording tests made on the latest model of a Bueb bench of eighteen retorts, it is stated that the bench can produce 17,000 cubic metres of gas per man per squad. In a previous issue of the same journal (March 5, 1910), Herr Peischer, describing tests on the horizontal chambers at Innsbrück, gives them as equal to a make of 1800 cubic metres per man [see "JOURNAL," Vol. CX., p. 231]. On the other hand, M. Rank, the Engineer at Munich, gives a make of 18,000 cubic metres per man and per day with the inclined chambers there. The juxtaposition of these figures shows that they cannot be useful for purposes of comparison, owing to their defect of not defining in detail the number of men employed and the work done by each man.

The new methods of carbonization seem to continue to take their stand on long carbonization in bulk (horizontal retorts of 6 metres with minimum charges of 600 kilos., filled-up vertical retorts, and chambers). This best solves labour difficulties, while enabling the maximum number of calories per ton to be obtained. Nevertheless, Dr. Bueb is of a contrary opinion, as he has modified his bench of 12 vertical retorts into one of 18 retorts of smaller section, with which he seems to have effected considerable economy in fuel without greater labour owing to working in series of three retorts. A definite opinion would be premature, especially in France, where the antiquated question of lighting power seems to bar the road along which English and German engineers are moving. Without fear of being thought paradoxical, it might almost be said that the report of M. Dausset to the Municipal Council of Paris (Bulletin Municipal Officiel of Paris, Jan. 7, 1911, p. 178), where, for the first time in France, the lighting power of gas has been looked at in a rational light, is one of the notable facts of gas manufacture during the last twelve months.

Condensation.—It would seem that the theories of slow and hot condensation of gas continue to lose ground. The facts and the figures brought forward last year by M. Sainte-Claire Deville justify the rapid and brutal—one might say—cooling of gas and the immediate arrest of almost the whole of the products of condensation. The heavy losses in benzol and naphthalene per cubic metre are comparable, but while 0·5 gr. less per cubic metre of benzol is insignificant, the same amount less of naphthalene is sufficient to alter completely the character of the distribution and to do away with obstructions in town. Such a result as this need not be insisted upon. The practical gas engineer abroad thinks the same, if one may judge by what is done in England and elsewhere. [See Note by Dr. Ott, of Zurich, "Journal des Usines à Gaz," Jan. 20, 1911.] It is not without interest to remark that these new theories were exactly determined by the Paris Gas Company in 1907.

Purification.—Two processes for utilizing the sulphur in gas to make sulphuric acid for sulphate of ammonia are submitted for the test of practical working. The Feld process adopts the intermediary of a solution of sulphate of zinc or of iron in order to fix the ammonia in the state of sulphate. The metallic sulphate formed at the same time is later attacked by a mixture of sulphurous acid and air produced by combustion of sulphur in a small special furnace. This sulphur itself is most of the time recuperated from the gas when the latter contains sufficient of it, which is generally the case. Thus a solution is obtained progressively enriched in sulphate of ammonia which solution is evaporated and crystallized. The Burkheiser process transforms by combustion the sulphur fixed by the oxide of iron of the purification. It sends the sulphurous acid mixed with air in excess thus produced into ammoniacal liquor recovered from the other part, forming thus sulphite, then sulphate of ammonia in solution, which is evaporated and turned into crystals.

Here may be called to mind the process which M. De Lachomette brought forward at the Congress at Boulogne* (1888), which also utilized the sulphur absorbed by the purifying material to produce sulphurous acid, then sulphite of ammonia, transformed finally into sulphate by oxidation in air.

A new method of using the usual process of purification by oxide of iron has been shown by M. Allner, of Dessau. It has been adopted at Christiania, and consists in methodically changing the oxide boxes every 24 hours, at the same time utilizing Valon's oxidizing reaction, but with the proportion of air of 5 and even 6 per cent. The fixing of the sulphuretted hydrogen being more rapid than the oxidation of sulphuret of iron, the ordinary working without change leads at the end of a certain time to the thorough sulphuretting of the first line and its being practically inefficacious. It requires regenerating. Instead of emptying it to reoxidize the bulk in air, the new method transposes it into the last line by a suitable arrangement of valves. As care has been taken to increase the amount of oxygen, this sulphuretted material, receiving only gas free from sulphur with a little oxygen in excess, is progressively regenerated, so as to be able to re-enter into the first line without other manipulation when its turn comes.

The use of this method, in which the last purifier box is always charged with sulphuret of iron, only seems to be possible if the cyanide is taken out in a special washer. Otherwise, the gas charged with hydrocyanic acid passing over the sulphuret of iron would free the sulphuretted hydrogen, as was shown by the late M. Perthius in 1895 (Twenty-Second Congress, Paris), and the purification would be ineffective.

* See "JOURNAL," Vol. LII., p. 421.

COMMISSION ON GAS APPLICATIONS.

The report of the Commission on the Applications of Gas, Heating, and Motive Power, is a short one, and contains little of general interest. During recent years the different uses of gas have been extended by new outlets, assisted by numerous renewals of municipal concessions at a general reduction of price. The economic transformation of modern life has created many needs which gas every day supplies.

In the short time so far available to the Commission, it has given attention to two problems—the rational use of gas for heating small apartments; and the use of gas in bakers' ovens.

The Gas Company of Paris has instituted a competition for gas heating apparatus, cheap, practical, economical, and suitable for small households. On the suggestion of the Commission, this has been extended to meet the needs of provincial towns as well; and the apparatus is to work satisfactorily at 30 mm. pressure.

Gas is particularly advantageous for bakers' ovens, both from the economic and social points of view. It is proposed to combine with the gas heating, the use of electricity for working the kneading troughs. To this end, the Commission has come to an arrangement with the Electrical Union of Paris with a view to arriving at a completely satisfactory apparatus, which in due course will be exhibited at the next Trade Exhibition.

Utilization of coke and tar and other gas derivatives will have the attention of the Commission from time to time.

The remaining two reports, dealing with distribution and technical instruction, are more lengthy and detailed documents, and will be noticed subsequently.

Manchester and Salford Smoke Abatement Exhibition.

An important step has been gained in Manchester for manufacturers of gas-fires, by the confirmation of the resolution of the Gas Committee to fix gas-fires and other gas-consuming devices of approved patterns on simple hire or on the three years' hire-purchase system. This arrangement comes into operation on the 29th inst. While the increased consumption of gas will undoubtedly add very materially to the revenue earned by the department, the resolution had the sympathy of the Council because it was introduced as a definite step towards abating the smoke nuisance in the city. The important Smoke Abatement Exhibition which is to be held in Manchester in November is receiving the practical support and sympathy of all departments of the Corporation; and readers may again be reminded of the important concessions made by the Committee to firms exhibiting in the Gas Section. The success which is attending the exhibition, we learn, leaves nothing to be desired; and it is pleasing to note that the Gas Section will be one of the strongest. The exhibition is to be held in the City Hall, Manchester. Referring to the decision of the City Council regarding gas-fires, Councillor James Kendall, J.P., the Hon. Secretary of the Exhibition, says: "Since this resolution was passed—which brings us the support of the Society of British Gas Industries—more than the amount of space originally allotted to gas exhibits has been reserved by manufacturers, awaiting the formal permission of the Society, which was promised us if we could get this concession through."

Liebig's Influence on Modern Chemistry.—A recent number of "Nature" contained the text of a lecture on "Liebig and His Influence on the Progress of Modern Chemistry," delivered at Oxford by Sir William A. Tilden, F.R.S. In the biographical portion of the lecture, the speaker referred to the appointment of Liebig, on the recommendation of Humboldt, at the early age of twenty-one, as Extraordinary Professor of Chemistry at Giessen, which position he held from 1824 till he was called to Munich in 1852. "In the Giessen Laboratory," said Sir William, "were trained a considerable number of chemists, many of whom became the teachers of the next generation. From these teachers and their pupils, guided by the same principles as those of the Giessen school, came discoveries of first-rate importance. If Hofmann, a student of Liebig's, had not been attracted to the study of aniline, an inconsiderable constituent of coal tar, if his pupil, Perkin, had not been led to a further study of its transformations, we should have had to wait a long time for the coal-tar dyes and the industries connected therewith. If a host of workers trained in Liebig's laboratory, and others emulating their example, had not cultivated the study of all sorts of carbon compounds, often unimportant in themselves, we should not have seen the numerous applications of chemistry to medicine—the saccharin, aspirin, antipyrin, sulphonal, &c.—nor the artificial perfumes, such as those of violet and lilac, which are now made independently of the original source in the flowers. Without the foundation work I have mentioned, we could not now have the beginnings of the true physiology based on the study of chemical and physical processes and reactions, nor the possibility of following the changes brought about by all sorts of ferments, on the combined results of which we may hope to have a complete development of a scientific system of medicine and the treatment of disease."

THE INVENTION, DEVELOPMENT, AND PRESENT POSITION OF THE DESSAU VERTICAL RETORT.

[COMMUNICATED.]

V.

The fourth article of this series [*ante*, p. 31] was largely devoted to a comparison of the merits of the Dessau intermittent system of vertical retorts and of the continuous system of vertical retorts as represented by the Glover-West type. The latest figures available at the time of writing were quoted in it; but in the brief interval which elapsed before the article saw the light in the columns of the "JOURNAL," further and later figures had been published in respect of both the Dessau intermittent system and two continuous systems of vertical retorts. These and some other recently disclosed results may appropriately be considered in this article, which brings the series to a conclusion.

COMPARATIVE RESULTS WITH OLD AND NEW INSTALLATIONS.

Objection has been raised [*ante*, p. 111] to the comparisons instituted in the last article between the results of trials made on the one hand with the Mariendorf setting of Dessau vertical retorts, and, on the other hand, with the St. Helens setting of Glover-West retorts. Manifest unfairness is alleged in regard to these comparisons, on the ground that the Mariendorf results refer to the very latest development of the Dessau system, while the St. Helens results relate to the first trial installation of Glover-West retorts put into operation nearly three years ago. The simplest way of refuting a charge of manifest unfairness based on such a ground is to institute another comparison in which the positions of the two systems in respect of the age of the installations are reversed. This course will now be taken by the writer. But he would first point out in passing, that the figures quoted in the last article for the Glover-West system were those of the only carefully conducted trials of which detailed results had been published up to the time of writing. These trials had been made between May 20 and Oct. 5, 1909 [*ante*, p. 31], while the trials of Dessau retorts of which the results were quoted for comparison were made on Oct. 31 to Nov. 5, 1909 [see "JOURNAL," Vol. CIX., p. 27], or practically contemporaneously with the Glover-West trials. The writer inclines to the belief that the gas-works manager will judge the relative merits of different types of settings by contemporaneous performances. However, the unfairness (if any) shown to the Glover-West system in the previous article shall in the sequel be transferred to the Dessau system.

The installation of Glover-West continuous retorts at the Droylsden works of the Manchester Corporation may presumably be taken as representing the very latest development of this system. Gas making was started with it in July, 1910. On the other hand, the installation of Dessau vertical retorts at Cologne was one of the earliest of this system on a really large scale; and it was put into operation over four years ago—*i.e.*, about Midsummer, 1907. Hence the writers' critics must agree that a comparison of the results obtained in these two installations will be manifestly unfair to the Dessau system. Bearing this in mind, let us pass on to make such a comparison.

The results obtained in ordinary working of the four-year old installation of 240 Dessau vertical retorts at Cologne throughout the twelve months ending March 31 last have recently been disclosed by Dr. F. Leisse [see "JOURNAL," Vol. CXV., p. 479]. The average make of gas in the twelve months was 14,203 cubic feet per ton of Westphalian coal. The gross calorific power of the gas averaged 526 B.Th.U. per cubic foot. These figures give a calorific valuation figure—*i.e.*, the make multiplied by the calorific power—of 7,464,875 B.Th.U. per ton of coal carbonized. It should not be forgotten that these are not figures relating to specially supervised or brief trials, in which the working may have been tuned-up to the highest pitch of perfection, but the averages for a twelvemonth of the ordinary everyday running of the largest of the early installations of vertical retorts. The installation is four years old, and by no means represents the very latest development of the Dessau system.

No figures are available with reference to vertical retorts operating on the continuous system which represent in the same comprehensive manner the all-round working performances of these retorts. But in regard to the one-year old installation of Glover-West retorts at the Droylsden works of the Manchester Corporation, Mr. J. G. Newbigging has given the results of a number of trial runs, and has stated that they are typical of the results secured during the whole of the working period of those retorts [see "JOURNAL," Vol. CXIV., p. 866]. Bearing in mind that trial runs of carbonizing plant not infrequently give higher results than those obtained in ordinary working, his figures must, in default of any others, be taken for comparison with the performances of Dessau retorts.

Three descriptions of coal—viz., Lancashire, Yorkshire, and Derbyshire—were tested in turn by Mr. Newbigging, and each in two ways. The object of one of these ways was to ascertain the quantity of 17-candle power gas obtainable from the coal. The figures relating thereto need not be considered in this connection, since the object aimed at therein was so totally different from the object of the ordinary working at the Cologne Gas-Works and at the majority of large gas-works in this country. The other trials conducted by Mr. Newbigging aimed at securing a large volume of gas of an illuminating power of 15 candles. Since this agrees substantially with the general aim of gas managers in this country and with the object of the ordinary working at the Cologne Gas-Works, the figures obtained by Mr. Newbigging in these trials will alone be taken for the present comparison. They show that the average make per ton of coal was 13,842 cubic feet, and the mean gross calorific power of the gas was 548 B.Th.U. per cubic foot. Hence the calorific valuation figure is 7,585,415 B.Th.U. per ton of coal, which is 1·6 per cent. higher than the calorific valuation figure relating to the everyday working of the four-year old installation of Dessau retorts at Cologne.

But since English coals were used in the new Glover-West retorts at Droylsden, and Westphalian coals in the old Dessau retorts at Cologne, it might be contended that the comparison is futile, and that if the Glover-West retorts had been carbonizing coal equal in quality to the Westphalian coal ordinarily used at Cologne, they would have given a calorific valuation figure more than 1·6 per cent. better than that afforded by the old Cologne settings. Certain figures, however, which are available in regard to the coals used do not support such a contention.

Dr. Leisse made 118 analyses of the coal carbonized during the year at the Cologne Gas-Works, and he gives the average results. Mr. Newbigging has also given analyses of the Lancashire, Yorkshire, and Derbyshire coals used in the trials of the Glover-West retorts at the Droylsden works; and the average results thereof are stated below, alongside Dr. Leisse's figures for the coal used at Cologne:—

Average Composition of Coal Used.

—	Moisture.	Ash.	Volatile Matter.
Westphalian coal used in Dessau retorts at Cologne, per cent.	2·36	11·58	28·82
English coal used in Glover-West retorts at Droylsden, per cent.	1·29	6·76	31·52

The larger proportions of moisture and ash in the coal carbonized at Cologne are certainly to its disadvantage as a gas-producing material, and the carbonizing results will consequently be placed more nearly on an equal footing for comparative purposes if allowance is made for the different proportions of moisture and ash contained in the Westphalian and English coal. Allowing for the 13·94 per cent. of moisture and ash in the one case and the 8·05 per cent. in the other, it will be found that the make of gas in the Dessau retorts at Cologne averaged 16,504 cubic feet, and that in the Glover-West retorts at Droylsden 15,054 cubic feet per ton of ash-free dry coal. The calorific valuation figure then becomes for the Dessau retorts 8,674,035 B.Th.U. and for the Glover-West retorts 8,249,500 B.Th.U. per ton of ash-free dry coal. On this basis, the Dessau intermittent system of carbonization has an advantage of 9 per cent. in make per ton and 5 per cent. in the output of calories in the gas made, over the Glover-West continuous system. And the comparison is manifestly unfair to the Dessau system, because figures for a Dessau installation which was into operation four years ago are compared with those obtained by the latest development of the Glover-West system!

WORKING RESULTS WITH DESSAU RETORTS AT SUNDERLAND.

The working results obtained over a period of twelve months in the installation of sixty Dessau vertical retorts at Sunderland have been published since the fourth article of this series was written. They have been given by Mr. C. Dru Drury in the paper which he read before the meeting of the Institution of Gas Engineers [see "JOURNAL," Vol. CXIV., p. 851]. The paper constitutes a plain unvarnished statement of facts and observations which speak for themselves. The results may be quoted here with advantage, because they refer to the carbonization of English coal in Dessau retorts. Like the Cologne figures quoted above, they relate to the ordinary working over the period of twelve months ended March 31 last.

The coal carbonized during the twelve months dealt with has been a mixture of two second and two third class unscreened Durhams, containing on an average 1·835 per cent. of moisture, 9·59 per cent. of ash, and 29·07 per cent. of volatile matter (exclusive of moisture). It was as a rule very fine. The make of gas per ton of coal averaged 12,647 cubic feet, and the gas had a gross calorific power of 590 B.Th.U. per cubic foot. The calorific valuation figure was therefore 7,461,730 B.Th.U. per ton, which coincides closely with the valuation figure obtained from Westphalian coal at Cologne, where, however, the retorts were worked so as to give a greater volume of gas, though of lower calorific power. Allowing for the effect of the 11·425 per cent. of moisture and ash present in the Durham coals used, a year's working of the Sunderland installation of Dessau vertical retorts shows a make of 14,278 cubic feet of gas and a calorific valuation figure of 8,424,195 B.Th.U. per ton of ash-free dry coal. This latter figure, like the corresponding one for a year's working of the Cologne installation, is appreciably higher than that for the Glover-West retorts at Droylsden. It thus appears that regular everyday working at both Cologne and Sunderland has demonstrated that the Dessau system gives a considerably higher calorific valuation figure from the coal carbonized than is obtainable from the Glover-West vertical retorts at Droylsden. Yet neither the Cologne nor Sunderland installation of Dessau retorts by any means represents the latest development of this system.

Other interesting results reported by Mr. Drury referred to a trial run in the Dessau retorts at Sunderland with screened Derbyshire (Grassmoor) coal. The trial was made for Mr. J. Ferguson Bell, of Derby. Forty-five tons of this coal were carbonized with steaming, and afforded a make of 13,381 cubic feet of gas per ton; the gross calorific power of the gas being 586·5 B.Th.U.—giving a calorific valuation figure of 7,847,955 B.Th.U. per ton of coal used. The coal contained 12·28 per cent. of moisture and ash; hence the make of gas was 15,272 cubic feet, and the valuation figure 8,956,810 B.Th.U. per ton of ash-free dry coal. The latter figure is far ahead of anything achieved in special trials or otherwise in continuous vertical retorts. When Mr. Newbigging carbonized Derbyshire coal containing rather less (11·72 per cent.) moisture and ash in the Glover-West retorts at Droylsden, he obtained in one trial gas of nearly as high calorific power—viz., 582·4 B.Th.U. per cubic foot; but the make per ton was only 11,584 cubic feet, or about 13½ per cent. lower than that obtained from the Grassmoor coal in the Dessau retorts at Sunderland [*vide* "JOURNAL," Vol. CXIV., p. 866]. The writer does not, however, desire to lay great stress upon a result obtained in a special trial, since regular working results over a long period appear to him to afford a surer basis for judging the merits of a setting. In regard to the Dessau system, well authenticated working results extending over twelve months and more are available; and it has already been shown that they demonstrate the superiority of that system.

Results from Other Continuous Vertical Retorts.

Mr. J. P. Leather deserves the thanks of the gas industry for the paper which he read before the Institution of Gas Engineers, in which he narrated his experiences of the Woodall-Duckham system of continuous carbonization in vertical retorts [see "JOURNAL," Vol. CXIV., p. 857]. The account which he there gave of the difficulties encountered in the Burnley installation of these retorts, and of the way in which they have been, or are being, surmounted, is more valuable than any record from which such difficulties are omitted. The information he has given as to the make of gas per ton of coal and its quality is, however, admittedly not very full. Burnley coal has yielded 12,600 cubic feet of gas per ton. Mr. Leather quoted, however, some results obtained from four different kinds of coal—all but one English—in the later installation of Woodall-Duckham vertical retorts at the Lausanne Gas-Works. The mean of the results is 13,037 cubic feet per ton, of gas having a gross calorific power of 612½ B.Th.U. per cubic foot. This gives a calorific valuation figure of 7,985,160 B.Th.U. per ton of coal. The proportions of ash and moisture in the coals have not been given; so that it is not possible to deduce the calorific valuation figure per ton of ash-free dry coal, and thus make a comparison on substantially the same basis with the results obtained from Dessau retorts. Neither has it been stated whether the make of gas is corrected o 30 inches barometric pressure, or whether it is measured under the low barometric pressure (about 28·45 inches) prevailing at Lausanne. In the latter case, the corrected make becomes 12,346 cubic feet, and the valuation figure 7,560,000 B.Th.U. per ton. Mr. P. G. Moon, of Bournemouth, in the discussion on Mr. Leather's paper, gave the average make and calorific power of the gas from the Woodall-Duckham retorts at Lausanne for a period of six months, during which time, however, the retorts were not always in full work. The make quoted was 12,962 cubic feet per ton, and the gross calorific power of the gas 598 B.Th.U. Again, it is not stated whether the make was corrected to 30 inches barometer.

General Conclusion on Carbonizing Results.

It may be forthwith admitted that Mr. Leather has proved that continuous carbonization is feasible in vertical retorts on the Woodall-Duckham system. Others have proved that it is also feasible in vertical retorts on the Glover-West system. But nothing has yet been published to the writer's knowledge which clearly demonstrates that any system of continuous carbonization gives as high a gas-making return (as measured by the product of the make of gas and its calorific power) per ton of coal as the Dessau intermittent system of carbonization in vertical retorts. This will be obvious on reference to the figures [already quoted in this and earlier articles of this series] which are collected for convenience in Table VI.

It may be contended, perhaps, that the whole of the comparisons made in this article are vitiated by the fact that the same class of coal has not been carbonized in the different types of retorts. It is not, however, conceivable that it is by a mere chance that the figures which have been quoted for coals as widely divergent in origin and character as Derbyshire, Durham, Silesian, and Westphalian, have conspired to display the Dessau system in such a position of all-round superiority as compared with other systems of vertical retorts. If the claim of the Dessau setting to give the best carbonizing results, had rested on figures obtained with only one class of coal, it might have been regarded as insufficiently established. But uniformly high results with several classes carry conviction. The writer, however, would nevertheless welcome the further evidence that would be afforded if a suggestion which has been made were followed up—viz., that carbonizing trials should be made, under the supervision of an impartial committee, with precisely the same coal, in the Dessau and other systems of vertical retorts. The relative efficiencies of the different systems, in strictly comparable conditions, would thus be authoritatively established.

Position of the Dessau Vertical Retort.

The figures in Table VI. have been selected from all those published in technical papers with a view to demonstrating the

TABLE VI.—*Comparative Results with Dessau Intermittent and Two Systems of Continuous Vertical Retorts.*

Type of Setting.	Place.	Authority and "JOURNAL" Reference.	Date.	Duration.	Description of Coal.	Percentage of Ash *plus* Moisture in Coal.	Make of Gas, Cubic Feet.		Gross Calorific Power of Gas, B.Th.U. per Cubic Foot.	Valuation Figure. (Make × Calorific Power).	
							Per Ton of Coal as Used.	Per Ton of Ash-Free Dry Coal.		Per Ton of Coal as Used.	Per Ton of Ash-Free Dry Coal.
Glover-West. Continuous. Eight 20 feet retorts in setting.	St. Helens	H. G. Colman, Vol. CXV., p. 31	May-October, 1909.	About 14 days	Various English	6·945	12,282	13,199	580·9	7,134,615	7,667,095
Do. do.	Manchester	J. G. Newbigging, Vol. CXIV., p. 859	July, 1910, to June, 1911.	About 9 days	Lancashire, Yorkshire, and Derbyshire	8·05	13,842	15,054	548	7,585,415	8,249,500
Woodall-Duckham. Continuous.	Lausanne	J. P. Leather, Vol. CXIV., p. 859	February-May, 1911.	About 32 days	Various English and Saar	..	13,037*	..	612·5	7,985,160	..
Do. do.	do.	P. G. Moon, Vol. CXIV., p. 880	January-June, 1911.	6 months	Various	..	12,962*	..	598	7,751,275	..
Dessau. Intermittent. Eighteen 16·4-feet retorts in setting.	Mariendorf, Berlin	K. Bunte and Sentke, Vol. CIX., p. 27	November, 1909.	105 hours	Silesian	7·19	13,430	14,470	542·6	7,287,120	7,851,650
Dessau. Intermittent. Ten 13-feet retorts in setting.	Sunderland	C. D. Drury, Vol. CXIV., p. 851	April 1, 1910, to March 31, 1911.	12 months	Durham	11·425	12,647	14,278	590	7,461,730	8,424,195
Do. do.	do.	J. F. Bell, Vol. CXIV., p. 855	1911 (early)	Short	Derbyshire	12·28	13,381	15,272	586·5	7,847,955	8,956,810
Do. do.	Cologne	F. Leisse, Vol. CXV., p. 479	April 1, 1910, to March 31, 1911.	12 months	Westphalian	13·94	14,203	16,504	526	7,464,875	8,674,035

* It is not stated that these volumes are cubic feet at 30 inches bar. and 60° Fahr.

relative capabilities of different types of vertical retort-settings. The figures for settings working on the continuous principle are believed by the writer to be the best obtained in well authenticated trials or in regular working so far as results have been published. He has not knowingly withheld any which would show these settings to better advantage. The figures quoted for the performances of the Dessau intermittent type of vertical retorts are only typical of a very large mass of similar results from the many works at which these settings have been in regular use for several years past. If the comparison instituted in the table and the accompanying text is in any respect unfair, the unfairness is to the Dessau intermittent system. Nevertheless, the latter shows to conspicuous advantage throughout. The continuous systems of carbonization in vertical retorts have still a great amount of lee-way to make up ere they will approach the position at present held by the Dessau intermittent system in respect of the make of gas and the calories in the gas from a ton of coal in every-day practical working.

Many other points have been touched upon in the earlier articles of this series—such as the freedom of the gas produced in Dessau vertical retorts from naphthalene, the larger production of ammonia, the high grade of tar obtained, and (in particular) the great superiority of the residual coke. These good points of the Dessau system may be more or less completely attained also by the continuous vertical retorts; but there is no indication that superiority has been secured by the latter in respect of any one of them. Consequently, the writer thinks it unnecessary now to go further into details in matters which are not susceptible of such exact expression or of such fair comparison as the make of gas per ton of coal and the number of calories in the gas. Enough has been said in the earlier articles to show that the Dessau system is second to none in the yield and quality of the residuals obtained, while it is superior to any other in gas-making, which is the prime purpose of a retort-setting.

It would also be inappropriate now to discuss the principles of carbonization in vertical retorts, or the judgments given in Germany and Austria in support of the patents held there by the Dessau Retort Companies in respect of the carbonization of coal in vertical retorts, since it is understood that these matters will shortly be under consideration in the English Courts of Law.

Hygienic Advantages of Vertical Retorts.

There is, however, one point in which the Dessau vertical retort setting is alleged to be greatly inferior to the continuous vertical settings; that is in the production of smoke and fumes in the retort-house. It is easy to say that a system of carbonization is dirty and objectionable in this respect, and such a charge is not easy to disprove, since in every case it is a question of degree. The writer took advantage of a recent visit to Germany to inspect some installations of Dessau vertical retorts expressly with the object of observing the amount of smoke, dust, or fume liberated when the retorts are being discharged and recharged. Through the courtesy of Mr. E. Körting, he was allowed to see the Dessau vertical retort settings at two of the works of the Imperial Continental Gas Association in Berlin—viz., the old Holzmarkstrasse works, and the new works at Weissensee. The former works are on the River Spree in the centre of the City of Berlin, and are closely built round.

The old settings of horizontal retorts have been displaced by four settings of eighteen 5-metre and four settings of twelve 5-metre Dessau vertical retorts. With these eight settings an output of about 1,600,000 cubic feet of gas per diem is attained. Yet the steam on discharging the settings, and the smoke and dust on recharging, were quite negligible quantities. Proof of the freedom from dirt of the working with the new settings was found in the cleanliness of the buildings on the gas-works and in the immediate vicinity. The contrast in this respect between them and the façades of the houses abutting on the railway viaduct near by was most marked. The houses near the railway were quite black, those near the gas-works were clean and as little discoloured as any buildings can be in the heart of a great city. The gas-works, with its equipment of Dessau vertical retorts, was clearly producing less smoke and dirt than other factories in the neighbourhood, quite apart from the railway. Inside the retort-house, the absence of fume, smoke, and dirt was quite a revelation as to the cleanliness of the working of a modern installation of Dessau vertical retorts.

The same thing was noticeable at the outlying works at Weissensee, where there are three beds of eighteen 5-metre and five beds of twelve 5-metre Dessau vertical retorts. Smoke and fume were again negligible quantities when the retorts were charged and discharged, and the house and surroundings were as clean as the keenest hygienist could desire. The writer came to the conclusion that there could be no reasonable objection on this score to the introduction of Dessau vertical retort settings in any position or locality.

Uniformity in the Quality of Gas Made.

It has long been recognized that there is a marked difference in the quality of the gas evolved from horizontal and inclined retorts at different stages of the carbonization of the charge of coal. Dr. H. G. Colman, in a lecture which he delivered in Manchester in November, 1907 [“Journal,” Vol. C., p. 633], gave the results of an interesting series of analyses of the gas evolved from a good Derbyshire coal when carbonized in a horizontal retort at a temperature of about 1750° Fahr. The gas was collected for analysis at five different times after the commencement of carbonization—viz., at ½, 1½, 2½, 3½, and 5 hours. These analyses have been quoted by Mr. J. G. Newbigging to demonstrate the varying quality of the gas from intermittently charged horizontal retorts [see “Journal,” Vol. CXIV., p. 866]. If the calorific power of the gas is computed from these analyses (taking the mixture of ethylene and benzene as having when dry an average calorific power of 2650 B.Th.U. per cubic foot), it will be found that it ranges from about 857 B.Th.U. per cubic foot at half-an-hour after charging to about 470 B.Th.U. at five hours. That is to say, the difference between the highest and lowest calorific power is over 45 per cent. Nevertheless, an installation of horizontal retorts yields gas which, when tested at the inlet of the gasholder, does not, according to a chart published by Mr. Newbigging, show a greater variation than 14·91 per cent. in calorific power in 24 hours. The figures quoted and the chart given by him thus furnish clear proof of the equalizing effect on the quality of the gas entering the gasholder of the ordinary distribution over the 24 hours of the times of charging retorts. This distribution of the charging might in many gas-works be made even more regular, with the result that the variations in the quality of the gas entering the gasholder from intermittently charged retorts would fall below the 14·91 per cent. observed by Mr. Newbigging. But it is well known that such irregularities as his chart displays cause no practical inconvenience, because the gasholder serves in a very efficient manner to complete the equalization of the quality of the gas before it is delivered to the consumer. The gasholder cannot be dispensed with in gas supply for many other reasons, and, consequently, there is no real object to be attained in seeking to produce gas of more uniform quality than that hitherto produced the world over in intermittently charged horizontal and inclined retorts.

The gasholder, regarded merely as a mixer and equalizer, may not always be quite successful in producing a mixed gas suitable for distribution from gases varying so greatly in density as a poor coal gas and a rich carburetted water gas; and when it is a case of producing a mixed gas for distribution, any gas engineer who believes, with Mr. Newbigging, that there is some advantage in regularizing the quality of the gas prior to its admission to the gasholder, will naturally prefer that the mixed gas shall be directly produced in one plant, rather than that coal gas shall be made in (say) continuous vertical retorts, for subsequent admixture with water gas obtained from separate generating plant. The Dessau vertical retort, with its provision for steaming the coked charge, presents the desired means for producing mixed gas of more regular quality at the inlet to the gasholder than is otherwise obtainable.

The mixed gas obtained by steaming in Dessau vertical retorts is moreover as uniform in quality as the coal gas obtained by the ordinary methods of working horizontal or inclined retorts on gas-works. The two typical early installations of Dessau vertical retorts at Cologne and Sunderland afford proof of this statement. Mr. Newbigging has shown by charts that the difference between the highest and lowest recorded calorific values is, for gas made in horizontal retorts, 14·91 per cent., and for gas made in inclined retorts, 27·54 per cent. [see “Journal,” Vol. CXIV., p. 864]. Now a chart published by Herr Prenger, of Cologne, for the installation of 240 Dessau vertical retorts in that city, shows that, when his normal practice of charging one-quarter of the total number of the retorts every three hours is followed, the difference between the highest and lowest calorific values is about 16½ per cent. [see “Journal,” Vol. CII., p. 564, and the larger scale chart in the corresponding number of the “Journal für Gasbeleuchtung”]. Mr. C. Dru Drury has given charts, similar to those of Mr. Newbigging, for the gas from the installation of Dessau vertical retorts at Sunderland [see “Journal,” Vol. CXIV., p. 856]. One chart, which refers to the gas at the inlet of the holder, indicates that the difference between the highest and lowest recorded calorific values is well below 10 per cent. The other chart refers to the gas delivered from the holder, and shows that the difference between the highest and lowest recorded calorific values has been reduced, by the equalizing action of the gasholder, to about 3 per cent. A chart given by Mr. Newbigging for the gas produced in continuously worked Glover-West vertical retorts shows that the net calorific power ranges from about 475 to about 505 B.Th.U. in 24 hours—a difference of about 6 per cent.

It is thus clear that the fluctuations in the quality of the mixed gas produced in Dessau vertical retorts are appreciably less, at the inlet of the gasholder, than the corresponding fluctuations in the quality of coal gas, as made by Mr. Newbigging, from horizontal and inclined retorts. Presumably the latter gas, despite the great fluctuations, has proved, after passage through the gasholder, of sufficiently regular quality for the supply of consumers. Further, the fluctuations in the quality of the mixed gas produced in Dessau vertical retorts are very little greater than those of the coal gas produced in Glover-West vertical retorts, when the two gases are compared at the inlet of the gasholder. There is absolutely no evidence that the fluctuations in the quality of the gas supplied from the gasholder are any greater with gas produced by the Dessau intermittent system of vertical retorts than with gas produced by any continuous system. Indeed, if mixed gas is supplied instead of simple coal gas, the Dessau system should be more favourable than any other to regularity of quality being maintained in the gas distributed.

The Cost of Labour and Capital Charges.

The visits to the two works in Berlin referred to above served also to confirm the general impression already held of the great

ease of manipulation of the Dessau settings—particularly the new pattern with eighteen retorts in a bed—and of the low cost of labour for working them. In both the retort-houses visited, the discharging and re-charging were at the time being carried out entirely by one man, who was able to do the whole of the manipulation involved with the greatest ease and rapidity. The automatically-acting sprinklers in use quenched the coke in a uniform manner, with a marked freedom from over-saturation with water, and without the liberation into the retort-house of great volumes of steam. The re-charging of three retorts in one operation was also an instructive illustration of the advantages possessed by the new pattern of Dessau setting. The charges were uniformly put into all the retorts, and the lids were closed before any nuisance could be caused by the liberation of gas or smoke. Some figures were kindly given to the writer by Mr. Körting as to the total cost of labour for carbonizing with these new pattern Dessau settings. The figures refer to a retort-house carbonizing about 500 tons of coal, and therefore making about 7 million cubic feet of gas per day of 24 hours. The retort-house would be equipped with four benches, each containing seven settings of 18 vertical retorts, 16·4 feet in length, making a total of 504 retorts. The charge would remain in the retort for twelve hours, and during the last two hours steam would be introduced. The stokers and furnace men would work in two shifts of eight hours each—viz., from 7 a.m. to 3 p.m., and 7 p.m. to 3 a.m. There would be no stokers or furnace men on the premises between 3 and 7 o'clock. The foremen also would work in eight-hour shifts, but the other men would be employed for nine hours a day. The men required for the retort-house would then be as follows:—

—	Day.	Night.	Total.
Stokers for charging and discharging the retorts, filling generators, operating cocks for steaming, &c	6	6	12
For clinkering	3	3	6
For cleaning pitch pans in hydraulic and odd jobs	2	..	2
For cleaning and lubricating gearing and odd jobs	2	..	2
For scurfing and odd jobs	3	..	3
Foreman, each eight hours	..	..	3
Total			28

The labour required, including foremen, for a retort-house equipped with the latest type of Dessau vertical retorts is therefore, according to Mr. Körting's ripe experience, one man per setting per 24 hours, or (say) one man for every quarter-million cubic feet of gas made.

The cost of labour must, however, necessarily vary with the size of the installation, and the fluctuations in the number of settings in use. That it can be appreciably lower, however, with any other system of carbonization than with Dessau vertical retorts of the latest type is highly problematical if all the labour charges in the retort-house in regular working are taken into account. There is, moreover, with the Dessau system no uninterrupted consumption of power, for the withdrawal of coke and introduction of coal, which is an essential feature of the continuous systems of carbonization in vertical retorts.

The capital charges on a modern installation of carbonizing plant must vary greatly, whatever the system adopted, with the particular and local conditions, and the size of the installation involved. Even with the Dessau system, improvements are constantly being introduced which materially reduce, from time to time, the capital charges per 1000 cubic feet of gas made. Hence it seems best to omit from these articles detailed particulars of the cost of installations of different carbonizing plants, and merely to suggest that a gas engineer who has under consideration the erection of new settings, or the reconstruction of existing beds of retorts, should ascertain by an exact estimate whether the capital charges for Dessau retort-settings will not, in regular working over a number of years, prove lower than for any others.

DEVELOPMENT OF BYE-PRODUCT TREATMENT.

BENZOL RECOVERY FROM COKE-OVEN GAS.

By G. Stanley Cooper, B.Sc.

Some time ago ["Journal" for May 9, p. 365], the writer dealt with possibilities in the development of bye-product treatment, and outlined several methods by which various useful products might be obtained from gas-works residuals. In this direction, coke-oven practice has developed very considerably of late, especially on the Continent, where much expert attention has been devoted to perfecting processes by which the utmost value can be obtained from all the bye-products in the carbonization of coal. Especially is this the case in connection with the direct process for ammonia recovery, the extraction of benzol from the crude gas, &c. Processes are now being established in which the sulphur in the gas is utilized to provide the acid necessary to convert the ammonia into sulphate. The recovery of benzol, too, is practised with very satisfactory results; and though this is not a process which lends itself for adoption in gas-works, yet it is interesting in itself as showing the development of one of the principal "side-lines" of the gas industry. Several plants are at work in England where the ammonia is recovered by the direct process, and at the same time benzol is also recovered from the crude gas. One of the best known systems working in this way is that of the Koppers Coke-Oven Company, of Sheffield; and a very successful plant is in operation at the Cortonwood Colliery, near Barnsley, working on Koppers' system.

The principal feature of the Otto-Hilgenstock direct process—*i.e.*, the absence of all ammoniacal liquor—cannot be worked in connection with benzol recovery owing to cooling being necessary, and consequently condensation would take place and some liquor would be produced. If, however, the process is modified so as to produce a small amount of liquor, benzol can be recovered efficiently. But in this case, distillation is necessary, if the whole of the ammonia is to be recovered.

During a recent visit to the principal colliery centres of Germany, the writer had the opportunity of inspecting several installations of coke-ovens and bye-product plants. One of the most interesting of these was the installation at Bahnschacht Colliery, Waldenburg, Silesia. There are in operation at this particular place, 160 coke-ovens, 70 of which work on Koppers' regenerative system; the remaining ovens being of the old Otto-Hoffman type. The direct process for the recovery of ammonia is in use, and there is also a plant for the recovery of benzol. This installation was the first erected by Messrs. Koppers at which these two processes are in operation simultaneously. The gas from the whole of the ovens passes through the saturator, and the usual make of sulphate is about five to six tons daily, rising to seven tons when all the ovens are in use. With the regenerative ovens there is, of course, a considerable surplus of combustible gas. This gas is used at Waldenburg for firing boilers for steam-raising purposes; eight boilers being kept going regularly for the production of steam at a pressure of eight atmospheres.

One of the principal features of interest of this particular plant is the existence of a separate benzol factory—the Deutsche-Benzol Fabrik—which deals with the whole of the benzol recovered from this and several other installations in the neighbourhood. For the recovery of the benzol, the crude gas passes up high towers and meets streams of creosote oil and washing oil, which take the benzol out of the gas. This oil is then passed through various heating arrangements, treated first with indirect steam at a temperature of 105° C., and then with direct steam, whereby the temperature rises to 180° C. In this way, the crude benzol is caused to pass off as vapour, leaving the hot washing oil to be used again. The apparatus is so arranged that there is only a minimum waste of heat. For example, the latent heat of the benzol vapour, given out when this changes to a liquid, is absorbed by the cold washing oil containing benzol from the benzol scrubbers. Again, too, the hot washing oil at 180° C.—when the benzol has passed from it as a vapour—is further used to heat up more oil from the scrubbers. In this way, the process is rendered continuous and as economical as possible.

The crude benzol which has been separated, as set out above, is cleaned and then pumped into the stills. There are three stills arranged to work at different temperatures, and so attain good fractionation of the crude spirit. Before distillation, the benzol is subjected to thorough cleansing—being first well shaken and mixed with sulphuric acid. In the mixing tank, the mechanical stirrer is arranged to work on a horizontal axis, so as to nullify the effect of the different densities of the acid and benzol. From the acid tank the benzol passes to a second tank, where it is well scrubbed with water, and hence most of the acid removed; while finally, it is washed with caustic soda to remove all traces of the acid. The acid and alkali are supplied from overhead tanks.

After cleansing, the benzol goes into the first still, which has a capacity of 30,000 kilogrammes, and it is subjected to fractional distillation; the second and third stills working at different temperatures in turn. In this way, good fractionation of the benzol is brought about, and the following products are finally obtained: Light oil, raw and refined benzol, raw and refined toluol, raw and refined solvent naphtha, xylol, naphthalene, cumaron-harz (a resinous substance). For the products there are two storage tanks of a capacity of 1000 tons each, and fourteen cylinders, each capable of holding 47 tons. The plant averages an output of 450 tons per month; and it is interesting to note that about one-half of the amount is used for motors.

The Management of Steam, Gas, and Oil Engines.—Some "Notes and Memoranda on the Management of Steam Engines and Boilers and Gas and Oil Engines" have been published by His Majesty's Stationery Office, at the price of one penny. The pamphlet, which is of handy size, should be found useful by those whose duty it is to operate plants of the types referred to.

Engineership of the East Greenwich Gas-Works.—The breakdown in health which Mr. Joseph Tysoe recently experienced will (though happily he is now much better) have to some extent prepared his *confrères* for an announcement of his retirement from the position of Engineer of the East Greenwich Gas-Works. That this event is now impending may be gathered from an advertisement which appears on another page to-day, to the effect that the South Metropolitan Gas Company are prepared to receive applications from candidates for the post. The commencing salary will be £800 per annum.

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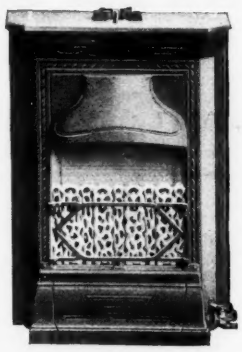

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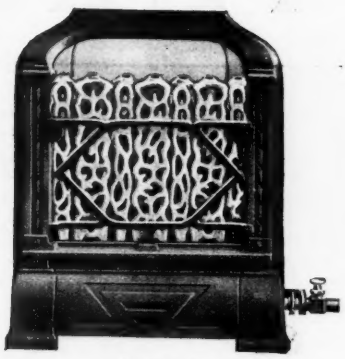

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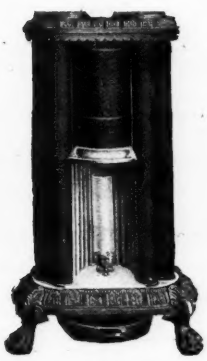

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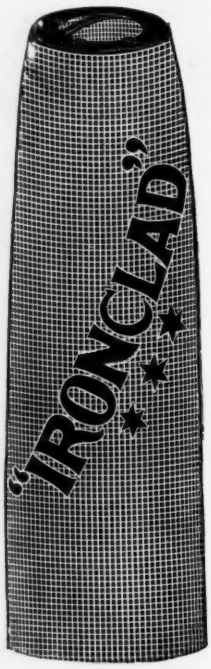

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RAILWAY GAS LIGHTING.

[COMMUNICATED.]

THE lighting department of a railway deals with probably more applications of the principles of illumination, and has more difficulties to overcome, than the average engineer realizes. Not only are the more common applications of lighting most varied, such as office, station, roadway, warehouse, &c., but there are many uncommon phases met with, in which it is somewhat more difficult to combine efficiency and economy—such, for instance, as signals and trains.

The problems to be faced are by no means lessened by the extended nature of the installations—stretching, in the case of some railways, practically all over England, a district (say) 300 miles long by 150 miles broad—and by the fact that hitherto but little attention has been devoted to these matters. Some explanation of the requirements of such a department, and of the difficulties which have to be overcome, may possibly be of assistance to brother lighting engineers; to gas managers, who seem to be becoming daily more anxious to meet the reasonable requirements of consumers, and who in many cases are good enough to go out of their way to render advice and assistance; and, not least, to manufacturers of apparatus, to whom a proper appreciation of certain railway requirements should be of considerable value.

The writer of the present article, entrusted with the organization of the lighting department of a large railway company some years ago, found a very mixed state of affairs awaiting him. By reason of the fact that the selection and fitting up of gas apparatus had hitherto been left in the hands of the officials in charge in each district of the line, it was found that there were more than thirty different types of lanterns in use, and a score of burners of incandescent and flat-flame variety. More than a dozen different sizes of mantles were required; and these were purchased from almost as many different sources. No attempt had been made to keep any proper record of the quantity of gas consumed, which led to carelessness and waste; and there was general, if strange, ignorance on the part of everyone as to the uses of the commoner apparatus, such as governors and pressure-gauges.

One of the first things done, therefore, was to experiment with, and fix upon, suitable and efficient types of lamps and burners which should be used as standards on all new or replacement work; so that gradually the multiplicity of types would disappear. Great progress has been made in the construction of lanterns and burners—more especially the latter—during the last five or ten years; and it was soon found possible to decide upon certain types of each which were a very great improvement upon anything previously in use. Two descriptions of lantern were fixed upon—a 16-inch square and a wall—both fitted with two doors, on opposite sides, so that the one on the lee-side could always be opened. This latter facility, which allows of the lamp being opened for cleaning or lighting purposes on two sides, saves a large number of mantles in windy weather.

The selection of burners with which to standardize presented many more difficulties, as there were so many different types to choose from. Naturally there was a desire to use only the most efficient, and also those of simple construction, which would be unlikely to give trouble. At this point, another consideration stepped in. The various installations being in so many different places, and even then at such greatly varying altitudes, caused the pressure at the several points to vary from about 20-10ths to 45-10ths; a few being below the former. It was clearly necessary to decide upon a standard pressure which could be maintained by means of suitable governors, so that all burners supplied could be made specially for use with it, and so prevent the waste of gas which would take place were a burner made to give best results at (say) 15-10ths put upon an installation of 30-10ths, and also because a burner which might give excellent results at (say) 30-10ths might not do so at the lower pressure of 20-10ths, which was decided upon as a standard for the whole system.

What waste and unsatisfactory results were taking place before this change was enforced, when burners made, some for 5-10ths, some for 10-10ths, and some for 15-10ths were placed upon pressures up to 45-10ths, may easily be imagined. Yet such is the lack of appreciation of even such simple principles, that this sort of thing is going on daily almost all over the country. The new idea, that it is to the gas manager's interest to see that his customers do not waste gas, and have satisfactory apparatus, appears to be slow in taking root everywhere, even in otherwise well-informed quarters.

Experiments, then, were undertaken with numerous burners. These were limited, I need hardly say, to the inverted type; and to those burners using approximately 4, 2, and 1 cubic feet of gas per hour, and giving about 80, 40, and 15 candle power respectively. According to the makers' statements, these consumptions should yield a greater efficiency; but as measured horizontally, and without any reflector behind the light, the above is about the best that one has reason to expect on a pressure of 20-10ths. The choice of a burner which shall be simple in construction and yet correctly designed in essentials, which shall have a non-metal nozzle which will not burn away, and which is made heavy enough to stand wear and tear and not too gentle handling, is perhaps not so easy a matter as might appear on the surface. The main conclusions, reached after a considerable amount of experience and experiment, point to the following features as being desirable:—

1.—The primary air should be absolutely protected from the products of combustion.
2.—The gas-nipple should have a single hole, correctly centred.
3.—The nozzle should be of fire-clay, steatite, or other non-burnable substance.
4.—The primary air and the subsequent mixture should be as cool as possible to get the highest efficiency, in installations where the pressure is (say) under 30-10ths. In order to ensure this, the mixing-tube should be short.

Possessing these points, there should not be much difficulty in getting the green or violetish cone in the flame, at 20-10ths pressure, which is a sure sign that the burner is an efficient one. But it is a strange thing that with many burners, made even by well-known firms with big reputations, it is found very difficult to get this evidence of satisfaction. Certainly, at first lighting, the majority of burners will give the desired "green cone" in the flame; but how many after half-an-hour's burning no longer do so? The following points which have caused lack of efficiency might be mentioned, and recommended to the makers for their consideration.

1.—The undue heating of the primary air or mixture.
2.—The nipple not giving a straight stream of gas, which would thus impinge on the side of the mixing-tube and so lose the injector action.
3.—The interior of the mixing-tube being too rough and impeding the progress of the mixture.
4.—The mixing-tube being too long or too sharply curved.

After a considerable amount of experiment, satisfactory types of burners were decided upon, and by their use, singly or several together, the problems usually offered appear to be met without waste of light or of gas. The small 15-candle power inverteds are principally used for lighting offices, passages, lavatories, and other places where small units are an advantage. The 40-candle power burners are put to some of the above uses as circumstances may require, and are also employed for lighting some small and less important stations. At points where a brilliant illumination is required, the 80-candle power burners, either singly or in twos or threes, meet every reasonable requirement.

Incandescent burners, however, no matter how efficient and desirable for general purposes, do not meet every requirement. For instance, in some places, such as warehouses, a light may only be required on one or two evenings during the year. Also in the case of signals, where only small illumination is needed, but where this must be absolutely reliable and not subject to the possibility of mantles breaking, either owing to vibration or wind, the flat-flame burner meets requirements. Consequently, there are thousands of positions where these burners are fitted and are likely to remain. This being so, it is desirable that those giving the best efficiency should be used. Those which one sees most generally in use are of the regulator type, which the makers officially state as being made for 5-10ths to 10-10ths pressure. Placing these upon the standard pressure of 20-10ths would therefore generally mean a decided loss. The makers will, however, supply flat-flame burners suitable for any pressure. After experiment, it was decided to obtain all made specially for 15-10ths pressure, as those made for 20-10ths, when placed on installations of this pressure, gave a somewhat weak flame for general requirements. Heads of the "union-jet" variety were decided upon in preference to the "slit-union," as the latter are more liable to be choked with dirt and dust. In a few cases where it was not going to pay to fix a mercurial governor at the meter, governed burners were fitted.

It is evident to any observer that flat-flame burners of the regulator type, which are unnecessarily wasteful, are still being fitted in great numbers even by gas undertakings themselves. Might one who has had some little experience with this subject suggest the advisability of investigating the difference in consumption and efficiency between the common and the special flat-flame burner?

Until the time when the lighting department was put upon a proper basis, it had been the practice to leave the cleaning of burners, replacement of mantles, and other matters of like nature, to the local officials, who generally delegated this duty to a porter or other similar official with no training in, or knowledge of, the subject. Very naturally this resulted in these matters not receiving the attention they should, and in the lighting itself suffering. In consequence, it was found advisable to divide the line up into districts, each containing from 300 to 600 burners; a man being appointed to clean burners and lamps, replace mantles, and do any trifling repairs in each. The only thing left to the discretion of the station staff was the lighting and extinguishing of the lamps. The system as described when put into practice was found to overcome many minor difficulties, and the lighting was instantly improved. Something like 30 per cent. of the mantle renewals were saved, and the change also obviated the necessity for sending out an experienced gas-fitter on many occasions. Taking the arrangement as a whole, the savings made nearly paid the wages of the men, besides which there was the immensely increased efficiency in the lighting.

Having reached this point, a measure of attention was turned

to the mantles. Experiments were undertaken with a view of determining the varieties which lasted longest without breaking, and which retained their candle power best over a period of hours. During these tests, the differences between various classes of mantles was most noticeable, some giving a much greater amount of illumination than others. It was, however, finally considered advisable to standardize with a substantial mantle giving only a medium quantity of illumination, but which did not drop its candle power greatly after continued use. Every batch of mantles is now tested by a certain number being burned in the test-room for 1000 hours; readings being taken at fixed intervals to ascertain if the candle power is maintained. It is acknowledged that this is not a wholly satisfactory method of testing; but it probably serves to detect any marked inferiority in any one batch. Having decided upon a standard, it was possible to purchase all mantles from the one maker instead of some dozen, as had been done previously. This, in itself, saved considerable trouble, and enabled better prices to be obtained for the larger quantity required. The question of mantles, though a comparatively minor one, and involving small sums of money as compared with larger questions, certainly repays some attention.

The lighting department does not stop at the provision of suitable and efficient burners, with supplying good mantles, and with keeping them in good condition. It is anxious to prevent waste of gas. Nothing has served this purpose better than the institution of the practice of making the local officials take a weekly reading of the meter and render a return of the consumption for comparison with the previous week and the previous year. These returns are entered at headquarters into ledgers, which allow of any undue increase to be instantly detected and an explanation obtained. Besides, this system permits of the gas accounts being very easily checked when rendered.

The new inverted burners also make towards economy; for an inverted burner using some 2 cubic feet of gas per hour, in my experience, may be very generally made to give about the same effective lighting as one of the older uprights using about 4 cubic feet per hour. In actual practice, however, it is quite usual with replacements to put in a more powerful burner, as the standard of illumination is rising year by year, and this prevents anticipated economies being made in many instances. But the better light is often obtained without increasing the gas consumption.

The special feature about railway lighting may, perhaps, be said to be its catholicity—that is, the fact that all kinds and conditions of lighting, each presenting its own problem, and many out of the ordinary rut, are dealt with in the day's work: Train lighting, which was dealt with in an article in the "JOURNAL" for Feb. 28 last (p. 586); signal lighting, where the problem is to provide a very small light, but one which can be absolutely relied upon to remain lighted—the effect of the flame being magnified many times by means of a suitable lens; signal-box lighting, where the object is to keep the glare out of the signalmen's eyes; yard lighting, which should be arranged so that dark shadows are not thrown by the waggons; and so on *ad infinitum*.

Many difficulties come up to be surmounted by the lighting department; but their overcoming provides one of the pleasures of living—successful work.

In conclusion, may the author mention the very kind assistance he has always had from gas engineers and managers in all parts of the country, not to say manufacturers of apparatus. He hopes that the above lines may present to them some phases in the life of one whose work is closely allied with their own.

FIRST COST OF GAS-FITTINGS AND APPLIANCES

By NORTON H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

THE first cost of fittings on the consumer's side of the meter has from the earliest days of gas supply been always a trouble and a hindrance to the extended use of gas; but in several respects the difficulty has never been more acute than it is to-day. A change has taken place in the habits of the people. The old idea was for everybody who could afford it to get his own house; and young couples, when marrying, looked out for an establishment that would last them to the end of their days. If they did not buy outright, they took on a long lease. Shopkeepers and business men followed the same lines. They acquired possession of their business premises, and a suitable residence attached to it or else adjoining. The landlord provided little beyond the walls and the roof. But now it is the rule for the landlord to do a great deal more. Not only have all classes of the community become more migratory in their habits, but a large class has sprung up in every district, comprising artizans, shop assistants, clerks, and generally persons who may be described as wage-earners, who take their residences on weekly or monthly terms, and expect to find them fitted with every modern convenience, and would as soon think of putting in gas-pipes at their own expense as of fixing bell-wires or hot-water cisterns. Even those who have the means object to the expenditure on various grounds. Perhaps in a few years, they say, methods of lighting and heating may be altogether revolutionized. Even where a good trade in gas-lighting is done, people now expect to spend a less sum over the whole fit-up than would formerly have been considered sufficient for the drawing-room gasalier alone. In fact, the day when it was possible for a private individual to make a good living profit on gas-fittings alone has long passed away.

The difficulty applies not only to new districts, but to old customers also. In many of our residential towns, if there is no extension worth the name, there are hundreds of customers whose premises were fitted fifty years ago or so. None too carefully or intelligently laid even in the first place, matters are not improved by the exigencies of wear and tear, by botching and alteration from time to time, including the addition of twice as many lights, a cooker, gas-fires, geyser, and other appliances not contemplated in the first place. The condition in many instances has reached an acute stage. The old installation is approaching its last legs and its latter end. A complete clearance of the old stuff is required, in favour of a new fit-out from stem to stern, suited to modern conditions and requirements. But neither the landlord nor the tenant is willing to pay for it.

The original idea was that the consumer, or his landlord, should provide and pay for everything inside the boundary of the premises. Some companies held up their hands in horror at the recklessness of even laying the service free so far as the public highway was concerned, and charged for the whole of the pipe and labour, together with a fee of 5s. or 10s. for tapping the main, to cover loss of gas and other incidentals. But it soon became evident a policy of this sort would render extension at the works an almost superfluous feature. One or two go-ahead companies commenced the plan of 30 feet of service free and a meter on hire, or even the whole up to the inlet of the meter free. This resulted soon in the universal adoption of a more liberal policy. History repeated itself in the matter of gas-cookers. So long as the consumer had to bear the expense of fitting up the gas-cooker, not one in a hundred, exclusive of people interested in the gas-works or the gas-lighting trade, cooked by gas. To-day, as a result not of supplying a fixture gratis, but of providing free of any first cost, at a moderate but not unremunerative rental, there are in most districts two cookers on hire to every three customers. So with gas-fires, wash-boilers, baths, &c. A substantial business can be done on hire terms. But the most striking illustration of the point is afforded by the automatic meter arrangement, under which a cooker and two or three lights are fitted, not gratis, but free of first cost, at a fair rental charged as an addition to the price of gas—perhaps 8d. or 9d. per 1000 cubic feet. The introduction of this system has elicited the important and interesting fact that in most districts there is a large proportion of the population—as much as one-tenth of the total—who are prepared to use gas, but have hitherto allowed the question to remain in abeyance because they are not able, or not willing, to spend money on gas-fittings.

In the average district, the demand for slot meters and cookers has been fairly covered. The public are so familiar with the use of appliances that the cookery demonstration and the exhibition are not required. But can it be said that the ground is fully covered, and that every customer willing to use gas has been obtained? Are there not many, belonging to what is colloquially termed the better class, who are willing to use gas but not to pay the price of gas-fittings? Are there not many who have used gas for years, but are thinking of discarding it on account of the vicissitudes of uncertain supply, leakages, and other troubles incidental to worn-out and bad fittings? There is also, in every district, more or less new business to be worked up.

To those who, having fitted up every available slot user, and saturated the demand for cookers, are looking out for fresh fields to conquer, I would make this suggestion. Why not extend the hire system to embrace anything and everything that is a promising medium for the consumption of gas, to be supplied subject to proper agreements with landlord and tenant, as usual with the slot system, at an annual rental of 10 to 15 per cent. on the cost? A great deal can be done for a £5 note, and experience shows that no gas consumer objects to a moderate quarterly rent—say, 2s. 6d., 3s., or 3s. 6d. There need be no more risk in working a system of this sort than is experienced with the automatic system. The main point in any hiring scheme is to ensure regular usage. It is not sufficient to place the apparatus. If satisfactory results are to be ensured, there must be a little judicious weeding out in the matter of apparatus only used about once a month.

But the automatic system carries another important advantage with it. We have all heard a great deal about the necessity of having full control up to and including the burner. Now if gas companies are to have this, in the full sense of the word, the apparatus up to and including the burner must remain their property. They can renew, alter, and repair their own property as they find necessary, but have no control, and cannot have anything like full control, over the property of others. As an incidental matter, the automatic and hiring systems secure this result, and that they do so contributes in no small measure to their success. Purchase by instalments, sometimes called hire-purchase, although hiring and purchasing are as distinct and inimicable as oil and water, will not meet the requirement. It is all right at the start while all is new. But if spread over seven years or so, the apparatus may, in the hands of a none too careful user, be worn out, or nearly so, before payments are complete, and the result is disappointment or dissatisfaction. The apparatus, even if in good condition, may be obsolete—having been replaced in these days of rapid progress by something having greater claim to efficiency or economy. After the purchaser has completed his payments and secured sole ownership, the position is just the same, and all the difficulties above referred to are experienced. It is supposed

that the possession of the appliances will render the consumer less willing to discontinue the use of gas. But when the apparatus approaches its last days, it may have the contrary effect. Occasionally difficulties arise under maintenance schemes, through the company being expected to take over old decrepit stuff, and maintain it in good order. If this is within the bounds of possibility, it can only be done at an expense that renders complete replacement a preferable alternative. The hire system is open to the objection that it increases the outlay, and the risk of having half-used apparatus returned. But it is the only way of meeting the difficulty; and the experience so far is such as to quite warrant its extension on the lines above suggested.

STRUCTURE OF INCANDESCENCE MANTLES.

By J. O. Zdanowich.

Careful examination of the structure of a freshly-made mantle, or after it has been in use for some little time, will unmistakably disclose the origin of the fabric used for its manufacture.

The structural differences are so distinct and decisive that there is no possibility of a mistake to be made as to whether cotton, ramie, or artificial silk was the basis for the manufacture of a given mantle. In the first instance, considering the difference in structure of the skeleton of a cotton and ramie-made mantle (by the naked eye), the apparent irregularity in thickness of the thread of ramie skeleton, being greater than that of cotton, leads to the supposition that the strength and durability of such a mantle ought to be inferior to that made of cotton. As a matter of fact, it is not the case, and very often it is just the reverse—provided: (*a*) in both cases mantles have been made by the same process (viz., nitrate) or simple conversion of the salts into their oxides by incineration, (*b*) or the ramie mantle is made by this process and cotton mantle by "precipitation" [see further]. Here it must be mentioned that there are practically no mantles on the market made from cotton by the ordinary (nitrate) process.

This supposition as to the durability will disappear when a mantle is examined under a microscope. The skeleton-ash of ramie-made mantles shows that every separate fibre of the raw-ramie fabric has conserved its original structure in the shape of resulting illuminating oxides of the rare earths, while that of cotton-made mantles shows more or less solid thread. Here, again, the difference of twist of both fabrics may be accounted for to a certain extent.

Taking then into consideration the length of the ramie (ultimate) fibres, which very often reaches 100 mm., and those of cotton, even of the best quality—such as Egyptian or Sea Island—which possess the longest fibre, and very seldom come up to 50 mm.—it will disclose the reason of the preference of ramie yarns to cotton; and this is the main reason why, since the discovery of the mantle made of cotton yarns, this has been gradually substituted by ramie and finally by artificial silk.

The above principally concerns both cotton and ramie mantles made by the ordinary nitrate process, as stated before.

There are now on the market a great many mantles which have been made, prior to incineration—*e.g.*, conversion of the salts into oxides by heat—by converting the illuminating salts into corresponding hydroxides, by subjecting the mantles to the action of a base capable of precipitating hydroxides from corresponding salts. Such conversion, or precipitation, of salts *in situ*, which leads to the deposit of hydroxides in colloidal state, when the operations have been conducted under proper conditions, raises the quality of cotton-made mantles, if not to the same standard as the ramie-made ones, in many ways even superior to them. For instance, the elasticity and tenacity are such as could not be obtained with a ramie mantle by any ordinary process. In regard to elasticity, it must not be forgotten that the addition of certain (by themselves) non-illuminating salts, in very wide limits, increases or diminishes the elasticity of a skeleton-ash, without, however, affecting the illuminating power of a mantle.

The above-mentioned difference in structure between ramie and cotton mantles led to the suggestion to substitute both fibres by artificial silk. Judging from the number of the applications for patents, numerous experiments have been carried out in this direction during the last ten years; and despite obvious difficulties which were met with at the beginning (chiefly in respect to storage and transit of such mantles), these are now overcome, and the artificial silk mantle is steadily and surely taking its well-deserved place on the market.

Examined under the microscope, this mantle shows that each skeleton thread is composed of great numbers of separate long, loose fibres of extreme evenness, with wide interstices. This latter property is the chief condition of high illumination, because of the greater surface. On the other hand, the fineness and evenness of the fibre spell less gas for giving the illuminating power; or with a given consumption of gas one gets better light; and above all the life of the mantle is much longer, not only because of the mechanical strain (weaker rush of gas and lower temperature of flame), but through the evenness and length of fibres. This is confirmed by experience, because when, after having been in use for some 1200 hours, such a mantle is examined under a microscope, it shows it has practically undergone no changes from its original appearance, whereas cotton or ramie mantles even in use for a less time will show a considerable structural change.

Another important factor is the remarkable elasticity and tenacity of a mantle, for reasons which follow from the above statements, and which practically could not be got with either cotton or ramie mantles.

As to the number of separate fibres in each single thread, it varies considerably, according to the quality and origin of artificial silk and the way of manufacture of mantles. Generally, it is between 16 and 200 separate fibres.

With regard to the manufacture of artificial silk mantles, there are numerous difficulties to overcome. In the first instance, the origin of artificial silk is an important factor. There are three kinds of silk on the market (Chardonnet, Cupper-Ammonia, and Viscose). Each requires different treatment, and the quality of resulting mantles will vary with the origin of silk. But whatever the kind of silk it is impossible to apply it to the manufacture of mantles by the ordinary (nitrate) process, owing probably to its structure and to the fact that we are dealing here with a modified cellulose or hydrate.

The next inconvenience to be considered is that the artificial silk, of whatever origin, when in a wet state (as is the case during the impregnation process), loses strength, and, consequently, requires extremely careful handling; otherwise breakage of thread and holes in the mantles result.

As to the knitting of stockings, thanks to the numerous perfections in the manufacture of silk in the course of the last few years, it stands fairly well the tension of a knitting-machine.

A few words may be said concerning the precipitation—viz., the conversion of nitrates (although other salts may be used as well) into their hydroxides. An extremely important fact is to get these hydroxides in colloidal state, whatever the precipitating agent may be, because in this condition only do they yield elastic and tenacious mantles.

Unfortunately, the chemistry of colloids is comparatively so little known, and the conditions of getting any substance in a perfect colloidal state are so delicate and difficult that very frequently working apparently under the same conditions, one gets different results, which an average manufacturer is always inclined to attribute to some other causes than the precipitation and subsequent treatment.

GAS FROM PEAT IN GERMANY.

According to a report by the American Consul at Stettin, the annual production of peat in Germany amounts to about 11 million tons; and regarding the heating qualities of the best peat, it has been established that the average peat is equal to dry beechwood of similar weight, and equal to coal of half the weight. He says that the industrial utilization of peat for lighting purposes has been attempted for many years in Germany; but as yet there has been no satisfactory solution of the problem of how to produce power gas from peat more cheaply than from coal. In conjunction therewith the generation of ammonia and of electricity has been attracting much attention in scientific quarters; and at the last annual convention of German scientists and physicists the problem was discussed as a result of new views and investigations presented by Dr. Caro, of Berlin.

In collaboration with Professor Frank, of Charlottenburg, Dr. Caro discovered a method for the economical utilization of peat, which he claims avoids former mistakes, and which he described as follows: The generator consists of shaft-like ovens, where the burning of the peat is conducted in a way admitting limited quantities of air. Thus also, a dry peat in pieces can be treated, and produces gas strongly impregnated with tar fumes. This gas, after purification from tar, furnishes a useful heating and power gas. The inventor found that if the gasification process is properly conducted, peat containing as much as 60 per cent. of water could be used. Peat having a percentage of water above this figure could be dried by storage in the open air. The process, Dr. Caro asserts, permits the manufacture of good heating gas during the entire year; and he claims that it can be used in connection with the generation of electricity. In view of the absence of constant water power in Germany, he thinks the invention will cheapen the cost of generating current. Another result of the discovery is the extraction of nitrogen by the process; 85 per cent. of this element, contained in the peat, being recovered. The nitrogen can be converted into ammonia by the introduction of steam; and the method admits of the production of ammonium sulphate—thus, of course, furnishing agriculture with a valuable fertilizer.

The Prussian Minister of Agriculture is now engaged in preparing a comprehensive law giving the Government extensive power to stimulate, by direct financial assistance, as well as by the use of all available governmental facilities in the broadest application, all efforts for the cultivation of the German marshes and moors, although 90 per cent. of the Prussian high moorlands are in private hands.

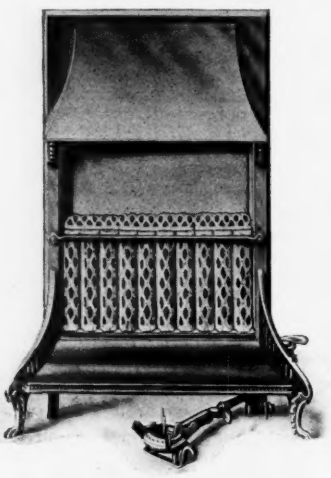
Mr. W. Parker has been appointed Superintendent of the Gas Street works of the Bolton Corporation, in succession to Mr. Arthur E. Saville, who recently left Bolton to take up duty as Manager and Secretary of the Farnham Gas and Electricity Works. Mr. Parker has been in the employ of the Bolton Gas Department for many years.

NEW AND CHOICE DESIGNS IN RICHMOND FIRES.

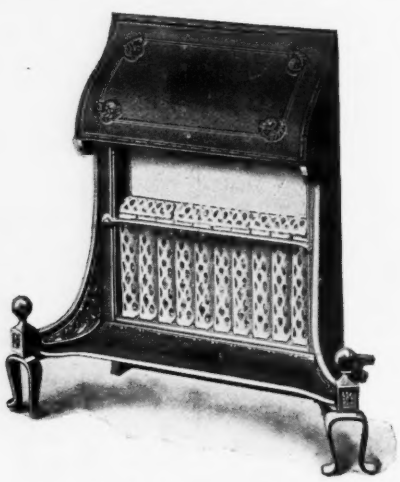
In our "Editorial Notes" last week, use was made of the words "Insure the future by your present policy;" and although the counsel was then more particularly directed to gas undertakings, it might equally well apply to manufacturers who play so important a part in supplying efficient and up-to-date apparatus for the utilization of gas. By what we saw a few days since at their showrooms, the Richmond Gas Stove and Meter Company remind us that not only are they, by their present programme, taking thought for the future, but that the broad lines laid down by them four years ago on which to develop their gas-fire business—that is to say, at the time the "A.B.C." series of fires was introduced—have, by the increasing demand for their specialities, been proved to have been entirely successful.

While fully satisfied with their past achievements, the Company recognize that the constant changes in the decorative style of houses to-day, demand gas-fires of even higher grade in design than the past has provided; and with this in view they have, at considerable cost, produced a new series of fires which they confidently think, and with good reason, will be adjudged as great an advance as their "A.B.C." fires were at the time of their introduction. The new fires are after, in their design, the decorative architecture of the various periods known in the art world; and, generally, the names by which they will be distinguished indicate the intention of the Richmond Company to provide, as already mentioned, designs that will harmonize with those high-class decorations. Interchangeability and standardization in the "Period" series (for this is the generic title of the new fires) is a prominent feature as in the "A.B.C." series. They are also fitted with the useful duplex burner. With the illustrations before them, readers will not require any description of the external appearance. We regard the designs as fine, and of exceedingly high artistic merit. There is something about them that gives them a distinctive stand from ordinary types of the day. In two instances, the fires have been constructed, so that the back plate will fit the usual size opening of the register grate—covering the cast iron of the latter, while leaving the tiled hearth and other decoration exposed.

The "Adam's" Dog Grate.



The "Louis" Fire.



The "Renaissance" Fire.

The "Flambeau" Fire.

An item worthy of mention, and quite unique so far as we are aware, is the position in which the boiling-burner (now so regularly demanded by consumers) is fitted. We are accustomed to boiling-burners on the top of fires, and recently they have become popular fitted on a swivel joint at the side. As one of the illustrations shows, the Richmond Company have gone a step further by placing the boiling-burner beneath the fender, from which it swings out readily when required. When not in use, it is hidden, and does not detract from the appearance of the fire. Associated with the construction of this new "Period" series on the scientific side, the name of Dr. Harold G. Colman should be mentioned. In the general design, the advice of some well-known professional gentlemen has been secured; and coupled therewith the resources of the Richmond works (which have never been so far-reaching as now) have combined to bring about a handsome, high-grade, and, we should say, thoroughly efficient series of fires. As to their finishes, the ground surface has been retained; and whether in art black, antique bronze, copper, or porcellanite, there is an attractive excellence about their appearance. The names of the fires are given under the illustrations; and lists are available incorporating the fullest particulars.

It will be remembered that the introduction some four or five years ago of the Company's "A.B.C." series marked a distinct change in the design and construction of gas-fires. Three different sizes of burners, and three different designs of fronts, provided a series of sixteen fires, in which every part was interchangeable with each fire of a similar sized opening. Each part was standardized and fitted so that any portion could be taken from one fire and placed in position on its fellow, and *vice-versâ*. This, coupled with a design simple in taste and artistic in appearance, and with all the present-day modern improvements, made it possible from that time to this to avoid change of patterns or in general construction. This has been greatly appreciated by the large number of gas undertakings that are hiring and selling this series of Richmond fires.

For the coming season, a higher standard still has been secured as regards radiant efficiency by the series; and both the brick and patent air-pad brick-slip are made with a special mixture which it is claimed shows a marked advance on previous results. The fuel has been increased in length; and the new "Lattice" design has given a graceful appearance. Here, again, the material used in the manufacture of the fuel has been still further improved with satisfactory results. There are two or three points about the fuel that arrest attention. In the first place, it is observed that each column is in perfectly perpendicular position, and (what is more) is incapable of moving from the vertical over its burner. This is ensured by lugs formed on the fire-brick backs, and a slot in the top of each fuel to engage with its particular lug. Bar supports are provided at the bottom, midway between the burner nipples. The fuel is flat-backed and curved in front, with a slight taper from bottom to top in depth but not in width. From the appearance point of view, the fuel is a great improvement. In front the openings are larger than those at the back; and inside the fuel are small projections which, immediately the flames begin to play on them, become incandescent. With the larger openings in front and the smaller ones at back a pleasing effect is obtained, as well as a free radiation from the back of the fuel. Looking at the incandescent fuel, one sees not only the incandescence of the front part but that of the back part as well. The fuel takes one's fancy. Before leaving the "A.B.C." series, it should be remarked that the changes indicated have in no way altered the interchangeability and standardization which have for so long been a feature. The series comprises five different designs in eighteen different sizes.

It is generally accepted that, with gas pressure varying at different periods of the day, a governor fitted on a gas-fire service ensures greater efficiency from the stove and greater satisfaction to the user. The gas and air adjuster ensures the provision of a correct flame, but is insufficient when the pressure alters either

through change in the district pressure, or through variable consumption in the house. To provide for this deficiency, the Richmond Company have introduced a governor combined with their gas and air adjuster. It is compact, very little larger than the gas and air adjuster itself, and is supplied at quite a moderate price. It is a distinct improvement upon the independent governor. It is interchangeable with the ordinary fitting on the "A.B.C." gas-fires and the new "Period" series. It can be set by the fitters, and then left with a certainty that not more than the required amount of gas will pass per hour. The invention is fully patented and protected. So we progress in matters of detail all contributing to efficiency.

Governor and Air Adjuster.

PUBLIC LIGHTING APPLIANCES.

GLANCING through the latest lists issued by the Public Lighting Department of Messrs. Parkinson and W. & B. Cowan (of Bell Barn Road Works, Birmingham) some special features attract attention; and a few moments may be spared to notice these. Before doing so, however, it may (though the name of the firm is a guarantee of good design and workmanship) be remarked that, before any of the lamps about to be alluded to have been put upon the market, they were subjected to careful trials on a testing tower which is fixed well above the works, and is exposed to all the high winds.

In the first place, there are two of Parkinson and Langlands' patents, which should appeal to those concerned with gas street lighting arrangements. The first of these (which has already been referred to in our pages) is in connection with inverted burner lanterns; and the particular object of the invention is to arrange and mount the burner and its fittings so that they can be raised from the outside clear of the interior of the lamp-body when the reflector and glazings are required to be cleaned, in order to prevent accidental damage to the mantle, and at the same time to facilitate the cleaning operations. It will be noted that the top of the lantern does not require to be lifted when the burner is being raised. This arrangement, which is calculated to result in a great saving of mantles, can be fitted to any of the firm's solid top lanterns. A point to be noted is that the primary air for combustion is obtained from outside the lantern, by means of a

Burner Lifting and Lowering Arrangement.

shaft—thereby excluding all products of combustion. The second of the two patents referred to is in connection with a momentary bunsen flash-light cock. In this case, the invention consists essentially in providing the lamp with a flash pilot or lighting jet controlled by a cock which is automatically opened when the trap-door in the base of the lamp is raised, by the engagement of the trap with a suitable lever or arm. The pilot-jet is thus ignited by the torch and lights the mantle. When the trap falls on the withdrawal of the torch, the cock automatically closes and cuts off the supply of gas to the pilot-jet. By the adoption of the device described, a considerable saving of gas is effected—as compared with the usual method of employing a continuously-burning bye-pass or pilot-jet—without injury to the mantle. The "Parkinson" patent ball-roller trap-door used in conjunction with this arrangement reduces the friction and jar of inserting the torch to a minimum; and no special torch is needed.

Momentary Bunsen Bye-Pass Cock.

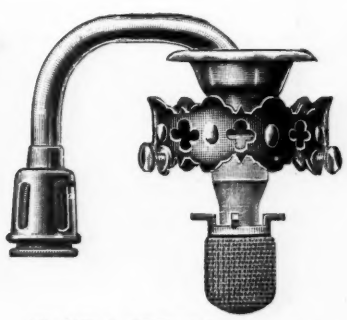
Among other items in the lists to which attention may be drawn are the "Parkinson" inverted burner arc lamps, which are constructed of strong, hard rolled copper throughout, and fitted with "Parkinson" heavy cast-brass angle burners, having outside gas and air regulators. These lamps are made in several styles. One pattern is for suspension, and is fitted with the ordinary lever; a second is also for suspension, but is provided with a side lever; while a third has been designed specially for street lighting, &c., and can be easily fitted to existing street-lamp columns. In each case the design is neat; and all parts are interchangeable. The lamps are in four sizes—for one, two, three, or four lights. Other styles of "Parkinson" inverted lanterns include the "Wind Proof" pattern, which is extensively used, and the "Blizzard Proof" (specially designed for fixing in exposed places, such as on promenades, &c.), which is also selling well. In addition to these, the firm have this season put on the market the "Parkinson" inverted burner circular shadowless lantern, which is particularly suitable for prominent positions.

FOR THE LIGHTING SEASON.

ATTENTION is called by the Provincial Incandescent Fittings Company, of Nos. 48 and 50, Thomas Street, Manchester, to some of the novelties they are introducing for the forthcoming lighting season.

There is the "Crab" patent safety mantle, the distinguishing feature of which is that each of the three lugs is fitted with a nickel wire running vertically to the bottom of the mantle, where

The "Aladdin's Lamp."



The "Pe-i-ef" Bent-Arm Burner.

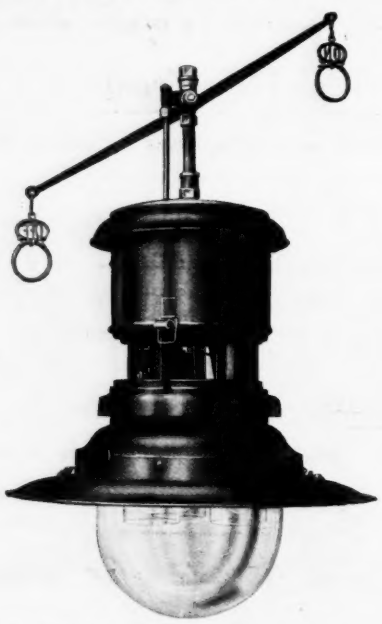
the three ends are joined. In this way, the mantle is fitted with a wire cage, the object of which is to prevent it from being touched when narrow chimneys are employed. The use of these

mantles—which are made for "Graetzin" fitting burners and for "Universal" fitting burners—will tend to reduce accidental breakages, and thus should prove economical. Then there is the "Crab" inverted burner, the most important feature of which is that it has neither screws nor springs of any kind with which to support the globe. There are just three plain lugs, specially made to receive the "Crab" patent collar, to which attention has already been drawn in the columns of the "JOURNAL." These collars are, it is learnt, being extensively adopted by gas undertakings running maintenance schemes, as they are found to save breakage of globes. The "Crab" burner is a well-finished article, and is, of course, fitted with the usual air and gas regulators.

Upright incandescent street-lamps can be converted to the inverted system by the use of the "Pifco" convertible street-burner, which is simple in construction, and at the same time well made. An attractive combination of "ancient and modern" is to be found in the "Aladdin's Lamp." This, as will be seem from the illustration, consists of an old-style lantern in combination with a "Bijou" burner-tube. Finished in oxidized copper, and panelled with green wavey glass, it is a very suitable lamp for small halls and show-rooms. The other illustration depicts the "Pe-i-ef" bent-arm burner, which is fitted with a china nozzle and mixing chamber. It is substantially made, and a convenient device for converting upright gas-fittings into inverted—the claim made for it being that it secures the same efficient lighting result as is achieved by the use of pendant burners. The "Pe-i-ef" bent-arm burner is fitted with a standard size mantle and standard size bijou globe. Finally, a word may be given to the "Gray's Inn" outdoor lamp, which is constructed on very similar lines to all hhe three-light "Graetzin" type lamps. An important feature, towever, is the ready accessibility of the burners and regulators, which can be got at simultaneously by the moving of a spring which raises a circular shutter.

THE "DEGEA" OUTDOOR LAMP.

AN improvement on the old type of "Degea" outdoor lamp has been inspected at the Farringdon Street premises of the Norden's and General Incandescent Company. Hitherto the gas and air adjusting has been done from the outside of the casing; but if for any purpose it became necessary to get to the inside portion, the lamp had to be disconnected. This has now been obviated. The adjusting is arranged for inside the lamp body; and easy access to the interior is afforded by the provision of a telescopic case. By a simple movement, the casing is opened all round, as shown in the illustration. When the casing is in its normal position,



"Degea" Outdoor Lamp.

the lamp is quite wind and weather proof; and another point is its simple construction—all the parts being interchangeable. There is a good range in sizes—from single burner to five light clusters. In the multiple-burner lamps, there is one permanent bye-pass; the lighting-up being completed by means of flash-lights. These lamps, which are finished in black or green enamel, are claimed to give the highest lighting efficiency with a minimum consumption of gas. If desired they can be made in copper; and for outside shop lighting they are also supplied with parabolic reflectors. When required for street lighting, they are provided with side levers. A point in favour of the side levers (though possibly they are not so ornamental in appearance) is that with them, in a multiple-burner lamp, it is possible to turn off a portion of the burners when no longer needed and leave only one alight.

PROPOSED REGULATIONS FOR PITCH WORKERS.

In the "JOURNAL" for Aug. 1 (p. 293), there were reproduced a series of regulations for the preservation of health proposed to be made under the Factory and Workshop Act, 1901, for application to all factories and workshops in which the manufacture of patent fuel with the addition of pitch is carried on, except those in which "no pitch other than blast-furnace pitch is used in the manufacture of briquettes." Objections to these draft regulations were received by the Secretary of State, who thereupon directed an inquiry to be held by Mr. A. H. Lush, Barrister-at-Law.

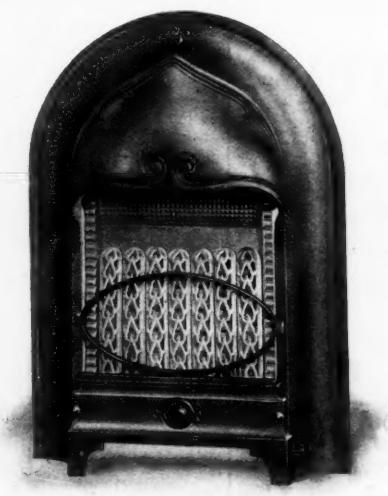
After having heard evidence and arguments, Mr. Lush has issued his report. The industry is not, he says, on the whole an unhealthy one—indeed, it is claimed to be in many respects exceptionally healthy. But there are two elements of danger—the action of pitch fragments or pitch dust on the eyes, and of pitch dust on the skin. As to the skin trouble, in the first place there is a burning sensation in the face and extreme sensitiveness to the action of the sun or keen winds. After a considerable period—usually several years—of working, there is a tendency for a peculiar kind of warts, known as "pitch warts," to form on the face and neck and various portions of the body. Usually these pitch warts are not malignant in character; but when they occur in particular parts of the body, there is a distinct liability to a third stage—namely, the form of cancer called epithelioma. So far as the evidence during the inquiry went, it showed that the cases of epithelioma in fuel workers do not arise immediately from the pitch dust, but only as a secondary result of pitch warts so situated as to be exposed to irritation. It is agreed that the disease is local in its origin—that is to say, it is due to dust which has settled on the actual part affected. As to the particular ingredient in the pitch which is at fault, Mr. Lush remarks that it must be something which is commonly present in pitch obtained from gas or oil works, but absent, or practically so, from blast-furnace pitch—the investigations of Dr. T. M. Legge (His Majesty's Medical Inspector of Factories), who drew up the proposed regulations, having shown that the mischief is confined to the two former, and that the last is innocuous. Mr. Lush goes on to say: "Mr. Hilditch, His Majesty's Inspector of Factories at Swansea, thinks this ingredient may be anthracene, or one of the phenols which come off at the last distilling. Anthracene had formerly a commercial value which it has lately lost; and it is no longer worth the while of manufacturers to separate it from the pitch. Consequently, there should be an increase, on Mr. Hilditch's theory, of the cases of disease in recent years. Certainly the impression I derived, from a comparison of the recollections of witnesses as to old cases with the returns of the last three or four years, is that there has been a decided increase; but a good deal must be allowed for the greater attention now paid to the disease." In this connection it may be recalled that, subsequent to the date of Mr. Lush's report, the Home Secretary, in answering a question—on the subject of cancer among workers with pitch—in the House of Commons [*ante*, p. 487], drew attention to the fact that it was not certain that anthracene was the constituent of ordinary pitch to which the prevalence of cancer in the industry was in reality due.

Towards the end of the inquiry, a proposal was made that, before the regulations were finally settled, time should be allowed for experiments to determine the various questions now undecided. This course Mr. Lush recommends should be adopted, on condition that experiments are conducted on certain lines which he indicates. The adjournment is to be until such time as the Secretary of State shall, on one month's notice in writing, determine—it being understood that twelve months will be allowed in the absence of reason to the contrary. "If in the meantime," adds Mr. Lush, "the mischievous agent in the pitch should chance to be detected, and a means of eliminating it discovered, which is commercially practicable, this would afford a more satisfactory solution of the difficulty than can possibly be attained by these regulations."

We are asked to call attention to the near approach of the time for the opening of the International Gas Exhibition which is to be held in the Royal Agricultural Hall from the 11th to the 24th of November. Full particulars as to spaces remaining vacant may be obtained from Mr. Thomas Cordingley, at No. 11, Queen Victoria Street, E.C.

In comparing the positions occupied by Germany and the United States in the coal-tar market, Mr. J. G. O'Neill, the Chief Chemist to the Empire Coke Company, of Geneva, U.S.A., says the United States annual production of close upon 100,000,000 gallons, valued at from 1d. to 1½d. a gallon, probably averages very close to the German price for coal tar. Of this quantity (figuring from the production of creosote oil), there are distilled about 56,000,000 gallons a year. Germany, which has developed every outlet for coal-tar products, values its tar at practically the same price as the United States, which has not developed its coal tar at all. One of the reasons for this lies probably in the fact that the German gas-works are content with a smaller margin of profit than the gas-works of the United States. Moreover, the Germans do not believe in burning up their coal tar, evidently figuring that a low price for it is better than burning it for fuel.

THE "PATHAN."



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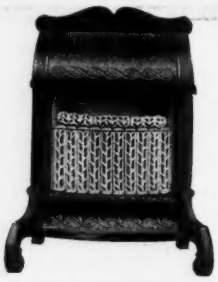
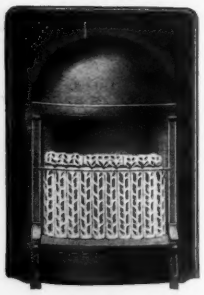

The "GELERT."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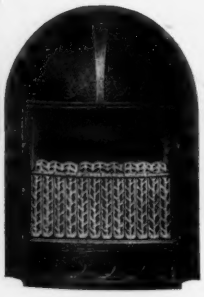
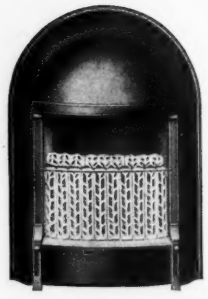
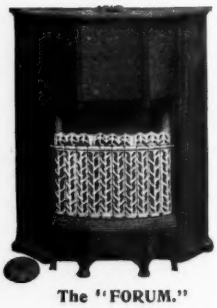
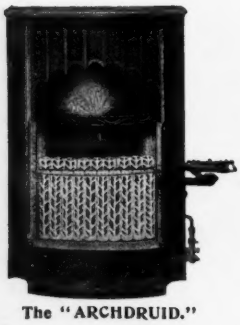

The "WIZARD."


The "MERLIN."

The "WARLOCK."


The "FORUM."


The "ARCHDRUID."

The "DRUID."

No. 278.

The "SALON."

The Patent "N.V."

The "STADIUM."

ATTITUDE OF THE AIR QUESTION IN RELATION TO GAS MANUFACTURE, PURIFICATION, AND REDUCTION OF QUALITY.

By William Key.

[A Paper read before the North British Gas Managers' Association on Thursday, Sept. 7.]

The revolutionary insistence in promoting the adoption of "mantles" in recent years has successfully disposed of what are already known as the "old-fashioned" naked-flame jets, which were in their day the result of years of thought, skill, and labour, and has cemented the minds of members of such Institutions as this in a universal approval of the enormous improvement in the volume of light obtainable from gas by their use—reflecting, as they do, a continual testimony to the world-renowned inventor, the Austrian, Carl von Welsbach; so much so that not a single wasteful, nocuous, flat-flame burner could at the present day be tolerated by any gas consumer who values a good light, his health, or his money.

An inverted mantle, with its surface combustion and brilliant luminosity, gives us a diminutive yet excellent representation of what takes place on the surface of the tens of thousands of miles in thickness of the great mantle of white cloudland which forms the photosphere of our luminary, the sun. The combustion of hydrogen gas on its surface in flames 30,000 miles in height produce incandescence, from which heat and light emanate. This mantle, within which the true sun and its atmosphere exist, is even more fragile than those we handle so gingerly every day, and always in tender memory of their inventor.

It is my privilege to show mechanical means of adjusting and maintaining uniform such quality of gas as gas engineers are agreed is most suitable for modern requirements.

Leading to this demonstration, I may be permitted to read extracts from a valuable paper by Mr. F. D. Marshall, of Copenhagen, read before the Institution of Gas Engineers in 1903:

"Both Dr. Bunte and Professor Lewes have shown over and over again, as, indeed, has Dr. Colman, the writer [Mr. Marshall], and many others—that the difference in calorific value of 16-candle gas, say, of 140 calories or 573 B.Th.U., and of 11-candle gas of 115 calories or 460 B.Th.U., has practically no influence on the light developed by the incandescent burner. Any variation in calorific intensity would be met by the air adjustment to the burner; and there appears to be no reason whatever why gas of more than 10-candle power need be supplied, provided a desirable calorific value were present."

These statements represent to-day more generally the predominant opinion in the minds of gas engineers and gas managers, and much more forcibly than existed eight years ago when given expression to by Mr. Marshall.

I have appended further interesting excerpts from the "Transactions" of the Gas Institute and the Institution of Gas Engineers for the period while I was a member—from 1884 to 1905. They are quoted in order to link-up early expressions on behalf of a reduced quality of coal gas by the admixture of air, giving reasons why atmospheric air should be used as the diluent of coal gas, and at the same time act as a revivifier of lime and oxide, without their removal from the purifiers.

In 1888, Mr. Norton H. Humphrys, of Salisbury, said "he had had some experience in the use of air for purification, which he introduced very gradually, because there were two things he was very cautious indeed about. . . . One was the depreciation of the illuminating power, and the other the fear of back-pressure in the purifiers. . . . He therefore gradually felt his way during several months, increasing the supply of air to the extent of perhaps 1 per cent. at each time; and now for several weeks he had been able to carry on revivification completely in the first purifier. He found no depreciation in the illuminating power, though he did not pretend to account for it. He made 15 to 15½ candle gas; and, working under exactly the same circumstances, the use of air had not made any difference whatever."

As to the revivification of lime in purifiers, in 1888, Dr. Thorne, of London, said "he had worked very much on this subject practically. . . . There was no doubt that the formation of sulphur compounds by the action of the sulphuretted hydrogen enabled the lime to take up the carbon disulphide and other sulphur compounds which were not taken up by it in its original oxidized form, and to produce highly sulphuretted calcium compounds, which, in their turn, easily became oxidized, and produced an active lime ready to again combine with the sulphuretted hydrogen, and become re-sulphurized and ready to take up afresh other sulphur compounds, much of the sulphur being deposited in the free state."

In 1888, Mr. Thomas Newbigging, of Manchester, said: "Another good point about the lime and oxygen process of purification now described was that its adoption would not displace the existing plant. . . . . The present purifying vessels would be retained; and though the process, if it proved successful, would cause a revolution in the method of purification, it would not revolutionize the purifiers. . . . . The disadvantages which arose from the employment of air pure and simple in the purifiers were so great that it was felt necessary to counteract them in some way. Hence the system of carburetting the air devised by Mr. J. G. Hawkins."

Mr. Denny Lane, of Cork, said "they were all doubtless aware that the air process of revivification was a very old one. Some thirty years ago, it was introduced by Mr. Hills."

In 1892, Mr. Thomas Goulden, of Beckton, and Mr. A. M. Paddon, on the subject of "The Technology of Water Gas," wrote: "A Lowe carburetted water-gas plant for a million cubic feet of gas per day costs £8800. Carburetted water gas costs 1s. 10½d. per 1000 cubic feet."

In the discussion on a paper by Mr. H. E. Jones, M.Inst.C.E., who, in 1902, took for his subject, "The Illuminating Power of the Gas of the Future," one of the speakers, Mr. J. D. Ashworth, of Portsmouth, said: "It gives me great pleasure to congratulate Mr. Jones upon his paper, which I regard as supporting what I brought before the Institution last year—namely, the desirability of reducing the illuminating power of coal gas to 10 candles."

In 1903, a paper by Mr. F. D. Marshall, of Copenhagen—on "Lighting by Means of an Admixture of Gas and Air"—contained the following passages:

"The object of this paper is to demonstrate that the results of the so-called high-pressure systems, where the mixing of air and gas takes place in the burner itself, can be reached and surpassed by low-pressure systems where the gas and air are mixed or intermingled beforehand.

"If we are bent on diluting and thinning down, we have a medium at hand in the form of air, which costs nothing, and which may be employed with extraordinarily successful results. The idea is by no means new. The late Mr. Frank Livesey showed conclusively the effects obtainable by mixing air and gas at some distance from the incandescent burner.

"Mr. Grafton showed some remarkable results; diluting very poor 13·3-candle gas still more by the addition of air until it was only 10·9 candles, the diluted mixture gave (with gradually increased pressure from 1 inch to 3 inches)—

76	candles,	as against	58 candles.
81	,,	,,	60 ,,
86	,,	,,	56 ,,

"By raising the pressure to 3 inches Mr. Grafton obtained 93 candles per 6 feet of mixture consumed, as against 56 candles with 6·74 cubic feet of unadulterated but low-grade gas.

"It is apparant that not only the addition of air, but pressure, plays a very important part in procuring these enhanced results."

On June 13 last the "Journal of Gas Lighting" (p. 721) wrote: "The altered conditions of the gas industry largely, if not completely, reverse the teachings of the past. Condensation should be organized with the view of minimizing the percentage of naphthalene in the gas. The natural absorbing agent of naphthalene is the vesicular tar in suspension in the gas at the outlet of the hydraulic main; . . . and this vesicular tar acts most effectively when cold. The gas must be rapidly and completely cooled as it leaves the hydraulic main, . . . and must be hastened by the introduction of a cooling condenser fed by the cold water as near as possible to the retorts."

A proportion of atmospheric air, or a 10 per cent. quality of petrol-air gas produced cold, and introduced into the hydraulic mains, would materially assist in obtaining and maintaining the desired results; and at the same time the hydraulic mains, pipe connections, and condensers will be kept free from tarry surfaces, and the accumulation of naphthalene in the mains and services prevented.

In order that the approved quality of gas may be produced in gas-works, it is essential that power be provided for the introduction of atmospheric air under such pressure as will deliver it cold into the hydraulic main, and in such measured volume as is necessary from day to day or for the time being. It may be necessary, in some instances, that the air be carburetted more or less to meet the revivifying conditions of the purifiers when oxide of iron is the purifying medium. This can be very simply done, and while the apparatus is in motion.

Purifiers becoming too small under former non-revivification conditions of working, will, under the air or carburetted air method of revivification, be much larger than are actually required.

The "Turbine" is a splendid apparatus for cheaply and very simply passing any required volume of air, or any percentage of carburetted air, into the hydraulic mains; and for small works it would be driven by using its own gas.

A "Centenary" petrol-air gas plant for a million cubic feet of gas per day, including petrol stock tank, costs £1500. The gas produced costs 6d. per 1000 cubic feet; gives 9-candle power per cubic foot; has a distinct gas odour; and is lighter than air. The plant would resemble a rotary washer, with a steam-engine at one end, geared-down to four revolutions per minute.

The gas is produced cold, and, by merely altering the petrol-feed regulator a tenth or two on the dial while the turbine is running, it will send forward air pure and simple, or a blue gas, or a low or high quality illuminating gas as required. A 10 per cent. quality of blue "Centenary" air-gas has been in use daily for some months in a small gas-works, where it passes through the cover of the hydraulic main and is most successful in diluting the very high quality gas the works otherwise could not help producing—mantles having taken the place of flat-flame burners.

Several years ago, the writer (being proprietor of a small country gas-works where the gas produced could not be brought down under 30-candle power) introduced one-third of atmospheric air with extraordinary advantage. The brilliancy of the lights by the mixture, using mantles, was quite phenomenal, and ultimately led to supplying the district with petrol air-gas only.

We may rest assured that, in the near future, tests for the

candle power of gas for illuminating purposes will be abandoned, and a standard of calorific value substituted.

Discussion.

The PRESIDENT (Mr. G. Keillor, of Broughty Ferry) invited discussion of the paper.

Mr. WALTER GRAFTON (Glasgow) regarded the plant which had been described as a meritorious one for the lighting of country houses by means of the incandescent mantle; but he could not quite reconcile himself to its use in a city or town such as Glasgow. Mr. Key quoted extracts from his (the speaker's) paper before the Gas Institute in 1901. He showed his first experiments, as quoted by Mr. Marshall, without taking into consideration any of the others. He (Mr. Grafton) showed results of 35 candles per cubic foot of gas—an increase of light of 115 per cent. per cubic foot, besides a reduction of 40 per cent. in the gas consumed, by using a common Kern or "C" burner, with 7-inch chimney and mantle, by simply mixing 27 per cent. of air with the gas before reaching the burner. These were far better results than the low—though they were good—results given by Mr. Marshall, and repeated by Mr. Key. It suited Mr. Marshall's purpose to quote his (Mr. Grafton's) first experiments; and he would like them to know that these tests were made on the basis of 3½ cubic feet, at one-inch pressure, using gas of 16 candles as tested in those days. He gave, ten years ago, some of the advantages accruing by the addition of air to illuminating gas. The great advantage which he saw was that an increased light followed the use of more aërated gas, by additional pressure, but that when using more of the pure gas the efficiency fell as the pressure increased. Reference had been made to the paper by Messrs. Goulden and A. M. Paddon, on carburetted water gas, giving the cost at 1s. 10½d. per 1000 cubic feet. He was afraid Mr. Key should have omitted the shilling; for he was pretty certain that the cost at Beckton to-day for carburetted water gas was nearer 10½d. only. The paper gave no data as to the value of this recommended petrol air gas. Generally speaking, a gallon of petrol would cost (including the tax) 1s. 2d., and might make about 1500 cubic feet of carburetted air. Therefore the cost for this item alone was 10d. per 1000 cubic feet, without taking into consideration the plant to make and deal with this quantity of gas. The gas might yield, with special burners consuming about 10 cubic feet per hour, 45 candles, or 4½ candles per foot, as against 20 or 30 comfortable candles from Glasgow gas. By the better blending of town gas with air, 45 candles per foot could be guaranteed, which was equal to a comparison of one against ten, or town gas at 8s. per 1000 cubic feet was equal to petrol air gas, if consumed at high pressure, after the same manner as the petrolized wind. For fuel purposes, the difference was yet more considerably in favour of town gas, because the thermal value of petrol air gas was about 90 B.Th.U., as against Glasgow gas of 600 B.Th.U., or its equivalent at the high price of 7s. per 1000 cubic feet. As a fact, it was not the most economical gas for cooking or heating purposes; and the manipulation of the flames was difficult to set. In fact, carburetted water gas cost just the same; but having a thermal value five times as great, it was a better invigorator—he would not call it a diluent—of coal gas. He could not understand a gentleman like Mr. Key recommending the use of such rubbish as a tonic for the betterment of Glasgow gas. However, he was sustained in the combat by the knowledge that he was championing the cause of the town consumer for cheap gas, by opposing this petroleum method.

Mr. G. R. HISLOP (Paisley) considered this rather a difficult subject for anyone who had not had personal experience to make any serious comment upon it. Evidently Mr. Grafton had gone into the matter. However, the proposal appeared to an outsider to be a very feasible thing. He could only speak from experience with pneumatic gas or gasoline, for which he had put in several installations in country houses; and these had all been very successful. He was not aware whether there were many, or any, in existence now; but he remembered that they could supply gas at about 5s. 6d. or 6s. per 1000 cubic feet. This was available for all domestic purposes. It had a very high illuminating power. Although, when compared with town gas, the gas was costly, yet for country houses it was a very useful appliance. He fancied that it was for country houses that the arrangement of Mr. Key was intended. A very crucial question came to be the absence of luminosity. He was afraid it would take a very long time to educate people to the want of luminosity. He himself proclaimed upon the house-tops that he did not make gas for flat-flame burners. Mr. Fyfe, of Glasgow, was very anxious to get a cheap gas; and he said that so long as he could get a good light in the mantle, that was all he aimed at. This was the position with regard to Mr. Key's lighting. He wanted no light from a flat flame; but he was afraid it would take a long time to educate people to this view. Therefore he feared that it would be a very considerable period before such an appliance as this could be supplied for lighting.

Mr. W. EWING (Lochgelly) looked upon the paper as containing a new theory in gas manufacture. There were hundreds of gas managers who had never seen air gas; and the result of the paper just read might be far-reaching, in connection with probably newer developments in the supply. He had known Mr. Key for a great many years, and could go back to the West of Scotland Association, where Mr. Young and Mr. Key both gave a paper on the same day—in 1874 or 1875. He carried down Mr. Young's model of a carburettor. Mr. Key's paper was on the effect of light hydrocarbons on coal gas. His air-gas plant, if not perfect, was on the right lines. There was a wide field for this plant all over the world. There was room for it, even in Scotland. He knew many places where the people were paying double for gas what it would cost if produced by such plant as this.

Mr. S. MILNE (Aberdeen) pointed out that, in the opening paragraph of his paper, Mr. Key spoke of flat-flame burners as being nocuous. He did not think they should allow such a statement to go from a gas managers' meeting without some qualification at least. They could understand flat-flame burners of a certain construction being used in such a way that they would be nocuous; but they knew that there were flat-flame burners through which gas could be properly consumed. He was pleased to have the figure Mr. Grafton quoted, that the calorific value of this 10 per cent. petrol air gas was 90 B.Th.U. per cubic foot. Perhaps Mr. Key would say whether this was his view or not. Mr. Key referred to different calorific values, and the candle power of different standards. He did not think he would have them believe that a 16-candle gas, diluted with air till it reached 11 candles, would have the same heating efficiency as a gas of 11 candles, produced in (say) a vertical retort. The whole gist of the paper seemed to be the advocating of the mixing of air with coal gas. Mr. Key spoke of a certain works where 30-candle power gas was being supplied, and where one-third of atmospheric air was introduced with advantage. He suggested such a system as being very useful, if they wished to rush-up the holder. Could any of them imagine what the effect would be if they rushed-in 33 per cent. of air into the holder spasmodically? The difficulty which would be experienced in all forms of heating and motive power would be extraordinary. He was not disputing the figures given with reference to Messrs. Goulden and Paddon; but he did say that these gentlemen stated that carburetted water gas had no odour, and that it was heavier than air. He took the trouble to look up the matter, and he found that these qualities applied to carbonic acid gas, and had nothing whatever to do with carburetted water gas. His opinion was that for country mansions, or places not supplied with town gas, petrol air gas was second to none.

Mr. R. G. SHADBOLT (Grantham) said the trend of the paper appeared to be, to his mind at any rate, the substitution of petrol air gas for carburetted water gas, as a means of helping them over a certain stile. The attitude of the air question, if it ever emerged, was dealt with very scantily. The reference by Mr. Milne to the dislocation which would be produced by the introduction of petrol air gas in large quantity was very well stated by Mr. Key himself, when he showed that an ordinary burner could be quickly adapted for use with petrol air gas. There they had the *crux* of the whole question. If they added a third of petrol air gas to their ordinary coal-gas supply, they would need to adjust everything in the district in the same degree; and if they came back to the former state of things, they would require to immediately re-adjust. Of course, this kind of thing was useless to them, as ordinary, practical, every-day gas suppliers. It might meet some of the claims Mr. Key made. One of these related to naphthalene, which was a bugbear with them still. When the meeting adjourned, he left the room with the feeling that they had had a comical turn that day in this paper—he really, honestly, could not take it seriously. But since he had re-entered the room, he had found that members had taken the matter seriously; and so he must only conclude that he had misinterpreted the meaning of the author. If they were to use petrol air gas under the conditions referred to, *per se*, for specific purposes, they would set their engines, or other appliances, to the gauge of this particular gas. But as to where its utility came in with regard to the supply of coal gas under ordinary obligations and stipulations, he did not quite see. Mr. Key had not only raked up history, and quoted from the sayings of people—possibly sayings which they never dreamt would be applied in this particular way—but he also acted in the *rôle* of prophet, and asked them to look forward to the time when gas engineers would not be required, and when manufacturers of gas plant would go to swell the ranks of the unemployed. When they reached the perfect state in which eight minutes a day would be the utmost that any man might be expected to work, then everything would do itself, of itself, for itself, and by itself.

Mr. KEY expressed disappointment that gentlemen who had been using air for the purpose of revivification had not come forward with their opinions as to the benefit from it. The main object of the paper was that in the Corporation of Glasgow a member said they could well afford to reduce the price of gas, because they were pumping air into the pipes. He wished that they should never use the word "air," but speak of the benefits to be got from petrol gas. He felt it a very high honour recently to have put in an installation in the Parish Church of Lugar, the district in which William Murdoch was born. There they told him that they had been at great expense in renovating the church, but could not use the lighting because of the mantles going black. He thanked Mr. Grafton for his remarks, also Mr. Hislop and Mr. Ewing. Regarding the remarks of Mr. Milne, what he referred to was that people could not burn gas without the smell being nocuous. As to putting in one-third of air into the holders, it was a small gas-works he referred to. He never had the least hitch in regard to anything dangerous or a nuisance; and they had a very brilliant light all the time from the use of 30 per cent. of air—the gas and air being mixed thoroughly in the holder. If the air were to be put into the hydraulic main, a blower would have to be used. He thought that the advantages to gas engineers would be enormous.

THE LIGHTING OF THE SCOTTISH EXHIBITION.

Visit of the Scottish Junior Gas Association.

What may be regarded as the first event of the session of the Scottish Junior Gas Association took place last Saturday, when the Western District paid a visit to the Scottish Exhibition in Glasgow. The principal object of the visit was to view the lighting arrangements. These are, so far as the largest installation of gas lighting is concerned, in the hands of Messrs. James Milne and Son, Limited, of Edinburgh. The Contractors have a gas-compressing station within the exhibition, in which there are placed gas-engines, in duplicate, each driving a rotary compressor, of the pattern made by Messrs. Milne and Son, each of which is capable of dealing with 4000 cubic feet of gas per hour, received at a pressure of 2½ inches, and raised to about 60 inches; the intention being to have a pressure of over 54 inches at the burner. The compressed gas is measured in two dry meters, each of a capacity of 400 lights. Half the compressing plant, and one meter, is provided as a stand-by. In the area of the grounds lighted by gas, there are 132 standards of Mannesmann tubing, 14 ft. 6 in. in height, upon which the lights are mounted, in singles or clusters of three lanterns, the attachment of the lamps being by swan-necks. Each lantern contains two lights, of the inverted incandescent pattern, each light taking 41 cubic feet of gas per hour, and yielding an efficiency, according to Corporation tests, of 50·1 candles per foot; the nominal lighting power of each lamp being rated at 2000 candles. The burners are made with special heat-resisting nozzles, and the heating of the gas and air is effected after mixture. The mantles used are of artificial silk, and are 5½ inches long, by 1¼ inches diameter. The breakages from ordinary causes are about one per day.

The high-pressure system is used also in the lighting of the Concert Hall—a very large apartment, in which both gas and electricity are used. The gas installation consists of three sun burners, of the "Nonpareil" type, each lamp containing 28 mantles. The electric lamps are of the glow variety.

The management of the exhibition recently began an extensive scheme of evening illumination, the interior of the buildings and the grounds being both treated. In the portion of this work which is served by gas, the system employed is on low pressure. The scheme of the illumination was devised by Mr. A. C. Freeman, the Engineer to the Exhibition. It extends on both sides of the River Kelvin from the Radnor Street entrance to the Prince of Wales Bridge at the Highland Village—a distance of 1250 feet, almost a quarter of a mile. There are 62 set pieces of ornamental illumination, consisting of crowns, crosses, &c. In these, the lamps—of the float pattern and with rat-tail burners—are placed at 6-inch centres.

The company assembled beside the Kelvin Hall at five o'clock. Considerably over a hundred were present. Members had been notified that they might bring ladies with them; and these formed a goodly proportion of the assembly.

Mr. J. M'GHEE (Glasgow) the President, intimated the arrangements for the walk round. Three parties were formed, and these, again, soon subdivided, which was to the advantage of the members, as the smaller parties received more explanation than the larger ones.

The first place visited was the compressor station of the Selas Lighting Company, Limited, of Manchester, to whom the lighting of the principal entrance to the exhibition—that in Kelvin Grove Street—has been entrusted. The installation consists of four lamps of 210-candle power each, six lamps of 300-candle power each, and 59 lamps of 100-candle power each—a total illumination of over 16,000 candles. The compressor is electrically driven. It is equal to raising the pressure of 30,000 cubic feet of gas per hour from 2½ inches to about 10 inches. The compressor is of 1-horse power capacity, but is seldom required to run so high—¾-horse power being found to be sufficient. Great care is exercised in the mixing of the gas and air, the proportions of which are two of air to one of gas.

The next visit paid was to the compressing station of Messrs. James Milne and Son, Limited, where Mr. R. Milne had a rotary compressor opened up for their inspection, and gave full explanation of the construction and working of the apparatus. In commenting upon the advantages of high-pressure gas, Mr. Milne stated that at the Milton House works, Edinburgh, his Company were in the process of discarding all other forms of gas supply, and were fitting up compressing plant in the various departments to provide high-pressure gas for both industrial and lighting purposes. The plant would be of a capacity of 8000 cubic feet an hour. The fixed plant in the station was seen both standing and at work.

In the Kelvin Hall, the Tilley High-Pressure Gas Syndicate, Limited, of London, exhibit two compressors—one driven by water, the other electrically. The former is equal to raising 180 cubic feet per hour to 38 inches pressure; and the latter is of a capacity of 500 cubic feet per hour, and is capable of producing a pressure of 60 inches. The stand was very brilliantly lighted by means of gas compressed by the plant.

There was then a walk through the grounds, undertaken in order that the illuminating effect might be observed. The opinion freely expressed was that the light of the gas-lamps in the grounds was exceedingly soft in character, and of great fulness, reaching to the furthest corners of open space, and shining upon the fronts of buildings in the exhibition with such clearness that the outlines of the structures, and the traceries of the decorations upon them, could be seen to great advantage, even at a distance.

At half-past seven, the party—now augmented to quite 160—assembled in the Carlton Restaurant, where they were entertained to tea by Messrs. James Milne and Son.

Mr. R. MILNE, at the close of the repast, said he was instructed, on behalf of his Company, to extend to them a very hearty welcome. They had with them Mr. Freeman, the Engineer of the Exhibition; and he wanted him to tell them all about the lighting of the exhibition, and more particularly how the lighting stood so far as gas was concerned.

Mr. A. C. FREEMAN stated that in the exhibition they had a total lighting power of two million candles. About 30 per cent. of this was exclusively by gas. He did not think there was anything very materially special in the gas-lighting scheme when they considered what had been seen in other exhibitions in London, Edinburgh, and Dublin; but he did say that the plan propounded had been carried out in a most eminently satisfactory manner by Messrs. Milne and Son. The scheme of high-pressure lighting was second to none, not even to that of the Crystal Palace. Though their units were smaller than in the Crystal Palace, he maintained that they gave a much better distribution of light. He also thought they worked more economically. He trusted that they had seen something which they could put into practice. Even if there were nothing which they could adopt, they might have seen something which they felt they ought to avoid. He hoped that those who were engaged in gas lighting would be able to give them a more flexible system of lighting. He did not think it would be an impossibility to do this.

The PRESIDENT thanked the members, on behalf of the Committee, for their presence. The illumination by gas in the exhibition redounded very greatly to the credit of Messrs. Milne and Son, and of Mr. Milne, their representative; and he asked them to recognize Messrs. Milne's kindness and generosity by according them a very hearty vote of thanks.

This was cordially given. Thereafter the party embarked upon motor-boats in the River Kelvin; and in the course of an enjoyable trip saw to great advantage the schemes of illumination on each side of the river. They were then admitted to the concert hall, where they witnessed an entertainment in the form of a pageant, and when the public had retired, the scheme of lighting the hall by gas and electricity was shown and explained to them. The contrast between the two systems was most marked; the more effective being, on all hands admitted to be, the gas one.

This was the last item on the programme.

PRODUCER GAS IN TEXAS.

The Use of Lignite.

There are contained in the July "Bulletin of the University of Texas" (U.S.A.) articles on the "Composition of Texas Coals and Lignites" and the "Use of Producer Gas in Texas"—the latter by Mr. Drury M'Neill Phillips. There is a brief introduction to the Bulletin, which is signed by Mr. W. B. Phillips (Director of the Bureau of Economic Geology and Technology), Mr. S. H. Worrell (Chief of the Testing Laboratory), and Mr. D. M'N. Phillips (Special Agent). In this, it is stated that during the last few years there has been a marked increase in the use of lignite in gas-producers; the gas thus made going to gas-engines for the generation of power. Lignite is also used in gas-producers for fuel to be employed in the burning of lime, &c. Considering the great extent of the lignite fields in Texas, and that it affords the cheapest and best fuel in the State (with the possible exception of natural gas in certain favoured localities), for many commercial purposes, it is well within reason to believe that this fuel will be their chief industrial reliance for power. Since 1895, the production of lignite has increased from 124,343 to 979,232 tons. In this period of sixteen years, the production of coal increased about 200 per cent., while that of lignite increased 700 per cent. The following is taken from Mr. M'Neill Phillips's article.

No illuminating gas is made from lignite, though an excellent light could be supplied by using some of the well-known types of incandescent mantles—such as the Welsbach, &c. There have been installed in Texas 56 producers for making gas. Of this number, there are now 47 in active operation. Of the 36 establishments that have been recorded, 23 use Texas lignite exclusively. The consumption of lignite at these plants is about 180 tons per 24 hours. Most of the installations are of comparatively small size; but the success that has been reached in the smaller plants indicates the adaptability of the producer and gas-engine to requirements varying from 50 to 250 H.P., quite as well as to the larger uses. The producer plants in Texas are scattered over a wide area; and this circumstance has an important bearing on the utilization of the bye-products—such as tar and ammoniacal liquor—for it means that they would have to be transported over considerable distances to some central plant for treatment. This is out of the question now; so that the utilization of the tar and ammoniacal liquor is possible only at the large plants.

The cost of the lignite, delivered, varies from 90 c. to $3·65 a ton, according to distance from the mines, amount involved in the contract, &c. The lignite area in Texas comprises nearly one-half of the whole known area in the United States, and is nearly as large

as the entire State of Missouri. Practically, all varieties of lignite are found here; and there is offered a wide choice to the designers of producer plants, even inclusive of material that carries 75 per cent. of volatile and combustible matter. There is no intention to prepare a dissertation on gas-producers, or to enter into the details of the design and construction of producer-gas plants. It is wished merely to give the chief results of personal observation at 26 plants that were visited and information derived by correspondence with ten other plants. It is beyond question that a very active interest is now being shown in the use of producer gas made from lignite; and as experience is gained both in the handling of the various types of producers, and, more especially, in the design and construction of engines to use large volumes of a gas of low heating power, the employment of lignite will grow.

If there is any one thing that stands out more prominently than others, as the result of these observations and investigations, it is that the best results in producer gas-engine practice are likely to follow from a consideration of the plant as a compact unit—a unit in which the producer is part of the engine and the engine part of the producer. Good results are obtained in establishments where the producer is designed and built without particular reference to the type of engine to be used, as also where the engine is supposed to handle the gas from almost any kind of standard producer. But it is believed that better results—more uniform and more economical—can be secured by designing the producer for the engine and the engine for the producer. Producer and engine must be regarded as a compact and symmetrical unit, to do a certain thing at all times to the best advantage. Furthermore, a producer and engine designed to operate on a certain kind of fuel cannot be expected to give as good results on some other kind of fuel. Within certain limits, to be determined when the plant is designed, the results should not vary excessively; but they will vary, through no fault of producer or engine, if the character of the fuel is materially changed. There is a wide variation in the composition of lignite; and this variation gives rise to differences in the amount and nature of the gas, the tar, and the ammoniacal liquor. An engine designed to operate on a rich gas will certainly not work to its rated capacity on a poor gas. It is not fed on material that it can utilize. If the heat units are not in the gas, the engine certainly cannot get them out; and if the heat units are not in his gas, the lime-burner certainly cannot burn his charge. It is not a question of tuyeres, or gas-ports, or air-valves; it is a question of heat units in the gas. A further fact worthy of mention is the apparent lack of interest shown by the manufacturers after installation and acceptance by the purchaser. The operator is frequently left to work out his troubles alone; and the almost invariable experience has been: "Trouble the first six months, but as soon as I learned to run my plant I got along fine. The manufacturers seemed not to care." Some makers are a gratifying exception to this general rule; but it is the belief of the writer that, if the makers took a more intimate interest in the operation of their equipment, there would be more general satisfaction, particularly during the first year.

The province of the producer-gas power plant is by no means unlimited. It has its uses; and for these particular uses it is undoubtedly the most efficient type of prime mover—water excepted, of course—yet developed. Where water for boiler purposes is scarce, and even where water is plentiful, but the size of the plant does not warrant condensers, the producer is peculiarly adapted—more especially if the distance from good steaming coal is great. The widespread area of lignite in Texas, its cheapness, and the question of water, all combine to make the producer-gas power plant well worthy of close consideration.

The article contains a number of analyses and tests of lignite. One set is by the Westinghouse Machine Company, of Pittsburg, who give the results of testing lignite from the mines of the Consumers' Lignite Company, of Hoyt, Wood County, Texas. The analysis of the lignite used was:—

	Per Cent.
Moisture	23·83
Volatile matter	38·32
Fixed carbon	29·22
Ash	8·63
Heating power, B.Th.U.	8007

The engine was operated 72 hours. The total lignite fired was 16,970 lbs. The average load was 128 brake-horse-power; and the gross lignite per brake-horse-power was 1·85 lbs. The gas was delivered through a line of 8-inch pipe over 650 feet long, with no correction for leaking or for gas consumed by three pilot-lights burning continuously in the producer-house, laboratory, and engine-room.

In another case, given by this Company, the same lignite being used, the following statement is made:—

Duration of test	46·5 hours
Total lignite fired	12,693 lbs.
Heat value per pound	8007 B.Th.U.
Total heat input	101,632,857 B.Th.U.
Total gas made (corrected to 62° Fahr. and 30 inches bar.)	612,361 cubic feet
or 49·03 cubic feet per pound of lignite fired.	
Total heat value of gas per cubic foot	128·3 B.Th.U.
Effective heat value of gas per cubic foot	117·1 B.Th.U.
Total output	78,565,816 B.Th.U.
Effective output	71,707,463 B.Th.U.

$$\text{Total efficiency} = \frac{78,565,816}{101,632,857} = \ldots .77\cdot3 \text{ per cent.}$$

$$\text{Effective efficiency} = \frac{71,717,463}{101,632,857} = \ldots .70\cdot5 \text{ per cent.}$$

The composition of the gas in this latter test was:—

	Per Cent.
Carbon dioxide	12·4
Oxygen	0·9
Carbon monoxide	13·3
Marsh gas	3·6
Hydrogen	14·7
Nitrogen	55·1

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Artificial Silk Mantles.

SIR,—In the article by Professor Nass, in your issue of Aug 29, about "Bamag" mantles, it is stated that the beginning of experiments to adapt artificial silk to the manufacture of mantles goes as far back as 1903, when Mr. Knöffler tried the effect of admixing hydroxydes of incandescent salts upon a cellulose solution, so as to spin it, after forcing it through fine orifices.

May I direct your attention to the fact that a French chemist, M. Plaissetty, was carrying out similar experiments in 1900; and that he applied for a patent in England in 1901—No. 20,747.

I may mention as well that, besides "Bamag" mantles, there have been on the market for some time artificial silk mantles the quality of which leaves nothing to be desired.

Wellesley House, South Kensington, Sept. 5, 1911. J. O. ZDANOWICH.

Gas and Electricity for Cooking and Heating.

SIR,—I notice from correspondence in various prints that the theory that electricity is as cheap as gas, or even cheaper, for cooking and heating purposes, is still being maintained. Apart from many other arguments which stand in the way of the acceptance of such a proposition, there is one which, even if it stood alone, would, to my mind, be perfectly final.

A kilowatt, or Board of Trade unit, of electricity, contains, approximately, 3500 British thermal units. Taking a cubic foot of gas at the extremely low figure of 500 B.Th.U. net, and reckoning gas at 2s. 6d. per 1000 cubic feet, and electricity at 3d. per unit, one finds that for the same money one can purchase more than fourteen times as many B.Th.U. in the form of gas as he can buy in the form of electricity.

These figures represent no *ex parte* statement or personal opinion, but are a matter of publicly known fact, which I believe require only to be examined to be found absolutely incontrovertible.

Essex Works, Birmingham, Sept. 14, 1911. H. JAMES YATES.

[In the London and many other districts, electricity is sold for heating and cooking purposes at 1d. per unit; and, in such cases, the number of B.Th.U.'s purchasable for 1d. with gas at 2s. 6d. per 1000 cubic feet, would be nearly five times the number realizable from a unit of electricity—that is to say, taking Mr. Yates's figures, approximately 3500 B.Th.U. per unit of electricity and 16,500 B.Th.U. from a pennyworth of gas.—ED. J.G.L.]

Gainsborough Gas Department.

The profit and loss account of the Gas Department for the year ending March 31 was presented at a recent meeting of the Gainsborough Urban District Council by Mr. Cooper, the Chairman of the Gas Committee. The statement showed receipts £16,112, and expenditure £15,910, revealing a profit of £201. During the past year extra discount was allowed amounting in all to £128; the total amount being now £1015. More coal was carbonized; and this item represents an expenditure of £310 in excess of last year. Repairs of works and renewals of mains entailed heavier expenditure than in the previous twelve months. Receipts from all sources are much in advance of last year; slot-meters alone producing £500 more. The quantity of gas made was 87,855,000 cubic feet, or an increase of 5,166,000 cubic feet. Coal was carbonized to the extent of 7729 tons, or an increase of 422 tons. The make of gas per ton of coal was 11,366 cubic feet, or an increase of 52 cubic feet. Gas-cookers continue to be in demand; the number now in use being 1025, or an increase of 79. The total number of consumers is 3010, which is an increase of 258 as compared with last year. The Committee have decided to give consumers another 2½ per cent. discount, making 10 per cent.

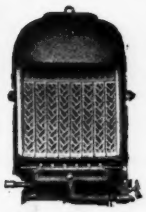
Suicide by Gas.—A verdict of "Suicide while temporarily insane" was returned by a Coroner's Jury who inquired into the circumstances attending the decease of a Birmingham master tailor named Levine, who was found dead on his bed. Attached to the gas-bracket (the tap of which was turned on) was a piece of rubber tubing, one end of which was near the man's mouth.

Gas Matters at Abercarn.—A recommendation by the Abercarn Gas Committee, that the public lighting of the district should be undertaken by the Works Committee out of the general district rate, led to some discussion. The Chairman (Mr. F. J. Matthews) explained that the step had been taken as it was thought that the Gas Committee did not receive a fair quota from the district rate. Mr. A. E. Meredith said that, in other words, the gas concern was not paying; and they did not like to ask for more money. Instead of running the works more cheaply, they were increasing the cost; and the figures relating to the gas undertaking should be supplied to the members. It was easy to show that the concern was a good thing, if they could "fleece the people" to do it. The matter was relegated to a joint meeting of the Works and Gas Committees; it being decided to publish the figures asked for.

Davis's

"Apollo" Front.

"Vesta" Front.



New Barless "Back."

"Minerva" Front.

"Vesta" Fire Complete.

New Barless Gas Fires

Chapter 2.

THE illustrations above show at a glance the principle of INTERCHANGEABILITY which we spoke of in Chapter 1 last week.

A "Back" is shown with specimen interchangeable fronts. The "Back" comprises Burner, Fuel, Brick, Cast-iron Back and Canopy in one piece, Gas and Air Adjusters, and the Right-and-Left Gas Connection.

All parts are machine fitted, so that any variety of front may be instantly transposed without additional fitting of any kind by simply undoing two thumbscrews. Gas Companies may thus stock the smallest possible number of parts, and thereby REDUCE MAINTENANCE CHARGES TO THE ABSOLUTE MINIMUM.

(To be continued next week.)

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MANCHESTER - 4, Victoria Arcade, Deansgate.
PARIS - - - - - 82, Rue d'Hauteville.

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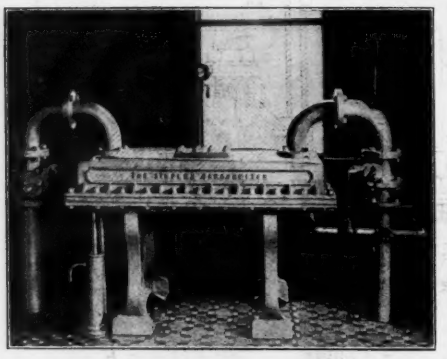

THE "SIMPLEX" VAPORIZER.

THE "SIMPLEX" VAPORIZER.

This Apparatus is specially suitable for the prevention of Naphthaline deposits in the districts.

Fixed near the inlet or outlet of Gasholder, it can be used to vaporize a suitable Hydrocarbon into the Gas in such quantities as to entirely prevent the deposition of Naphthaline in the mains or consumers' services.

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Please send for NEW GENERAL CATALOGUE.

Full of New Designs in FITTINGS, GLASSWARE, LAMPS, &c.

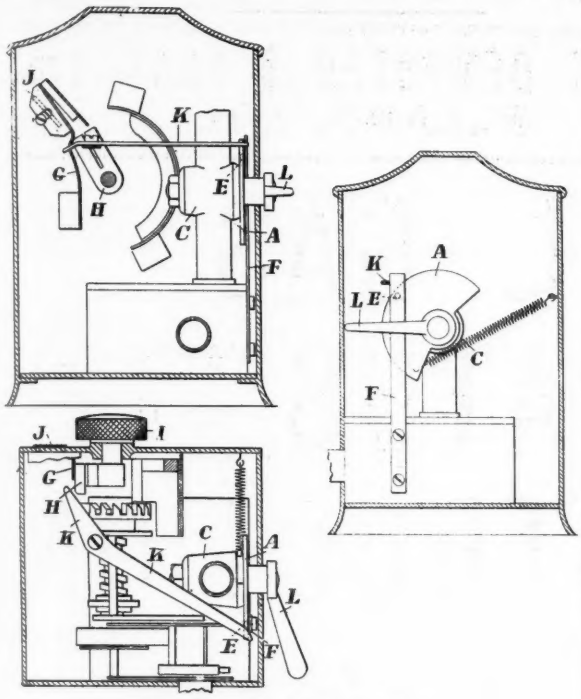
REGISTER OF PATENTS.

Gas Controlling Apparatus for Heating Appliances.

YATES, H. J., of Aston, near Birmingham.

No. 21,222; Sept. 12, 1910.

This invention relates to apparatus as described in patent No. 3377 of 1910, with the object of rendering the operation of the auxiliary tap necessary under all circumstances before gas can be obtained from the apparatus; the invention comprising the employment of means, in conjunction with the auxiliary tap and the coin carrier (or equivalent part), whereby, prior to every insertion of a coin in the apparatus, the tap is automatically closed.



Yates's Gas Controlling Apparatus.

The illustration shows a sectional side elevation, a sectional plan, and a sectional end elevation of the apparatus.

A bell-crank lever or a plate A is mounted in conjunction with the plug of the auxiliary tap C, and arranged for actuation by a spring. The tap is held open against the action of the spring by a pawl E, which engages an aperture in the plate. The pawl is carried on the spring blade F. By means of another spring blade G acting on the part of the coin-carrier H, which is actuated by the external knob I, the carrier normally lies in advance of the coin-slot J; so that before a coin can be inserted for operating the mechanism the coin-carrier must first be moved backwards. This movement is utilized to close the tap C through a lever K, which is acted upon by the coin-carrier at one end, and which, at the other end, is adapted to act upon the spring blade F for disengaging the pawl E from the plate A.

At each return movement of the coin-carrier for the reception of a coin, a similar operation is performed; so that if the auxiliary tap be open at the time, it will be liberated and automatically closed by its spring. The auxiliary tap is opened by manipulating the handle L against the spring action.

By the means described, gas cannot be obtained under any circumstance without the auxiliary tap being first closed, and, in consequence, "any inconvenience that might otherwise be caused by the user omitting to ignite the issuing gas at the fire or other appliance, after operating the main valve with a coin, is effectively avoided."

Cup-and-Ball Gas-Joint.

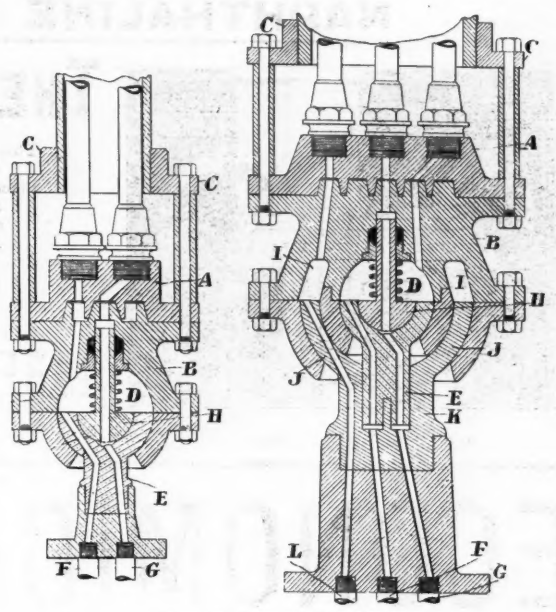
GLOVER, T., of Edmonton.

No. 27,491; Nov. 25, 1910.

This invention relates to a cup-and-ball joint in which two supplies of fluid or liquid can be passed through the same joint, and yet the supply for each will be controlled by separate valves.

For two lamps two supply pipes are connected each to a plate A by union joints, and communicating with separate holes in the plate—one leading to the centre of the plate. To the plate is attached, in a gas-tight manner, a socket B, having a central passage which communicates with the central hole in the plate, and another passage communicating with the other hole in the plate—the socket and the plate being connected together and to a ring C carried by the tubular bent arm of (say) a lamp standard or secured to the ceiling of a room.

The socket is formed hollow at D, and carries the usual cup, in which is a hollow half ball forming the ball proper, to the stem E of which, or to a piece attached to it, the gas bracket or chandelier is suspended. The hollow half ball has a central hole leading from the hollow and through its stem, and another hole through its wall and stem, so that two gas-pipes F G may be connected to the stem.



Glover's Cup-and-Ball Joint.

Inside the hollow half ball, is a half-sphere H, having a hole surmounted by a tube, which fits in a gas-tight manner in the central hole of the socket B. The half-sphere is controlled by a spring to keep it in gas-tight connection with the hollow half ball, and the connection of the tube with the socket is such that, though gas-tight, there is a slight amount of play to allow of the movement due to the action of the whole joint.

In this construction, the gas flows through one supply pipe through the hole in the plate A leading to the centre, then down the central tube and half-sphere H to the central hole in the hollow half ball; and through one hole in the stem E to one gas-pipe G; through the other supply pipe through the not central hole in the plate A into a hole (not central) in the socket B into the hollow D of the socket, and then through the hole in the body of the half hollow ball to the stem E to the other gas-pipe F. By fitting a valve in each pipe, the supply can be determined to both gas-pipes F G.

When three gas supplies are required (as shown), there are three gas-supply pipes, three union joints, and three holes in the plate; the third hole leading to a hole opening out in a ring channel I in the wall of the socket or otherwise to a second hollow half ball J, which is positioned outside the cup and held in place by another cup secured to the socket B. The second hollow half ball is secured to, or provided with, a stem K, and carrying the stem E of the hollow half-sphere; a hole in the wall stem of the half-sphere J communicating with the channel I and with the hole in the socket B.

The stem K, in this case, carries three gas-pipes F, G, L, and the hollow half balls with the cups and half-sphere are struck from the same centre for the proper movement of the hollow half ball.

Purification of Coal Gas.

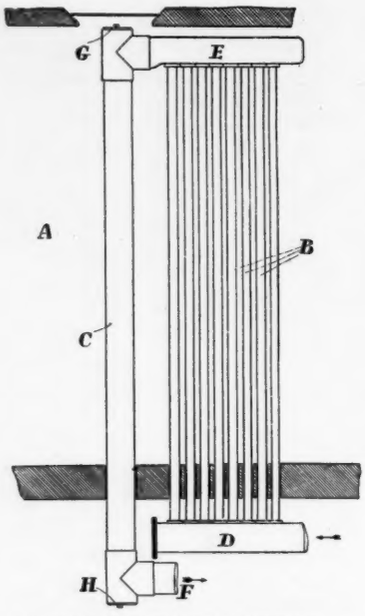
EVANS, E. V., of the South Metropolitan Gas Company, Old Kent Road, S.E.

No. 29,673; Dec. 21, 1910.

It is known, says the patentee, that the sulphur existing in coal gas in forms other than sulphuretted hydrogen, and present chiefly in the form of carbon bisulphide, can be partially converted into sulphuretted hydrogen by subjecting the gas to the action of a heated contact substance—such as firebrick, or iron, nickel or certain other metals, or compounds of such metals—either with or without the introduction of steam. He has found that in the case of fire-brick and like materials the temperature at which the conversion occurs is considerably higher than when metals like iron and nickel or their compounds are used, and that the temperature when iron or its compounds are the contact-substance is slightly higher than when nickel or its compounds are used. The chief difficulty which, it is said, has militated against the introduction of this mode of converting the sulphur into sulphuretted hydrogen, arises from the high temperature to which the contact-substance was heated—a temperature which soon proved fatal to externally-heated iron or like containers, and in some cases led to trouble owing to fusion of the contact-mass. He has, however, found that the temperature to which the contact-substance is heated need not be nearly so high as has been previously supposed if care be taken to preheat the gas before it passes over or through the heated contact-substance. This means that the furnace temperature can be reduced below that at which the iron pipes or other container of the contact-substance are rapidly deteriorated, and that at which trouble due to fusion of some forms of the contact-mass ensues.

According to the present invention, therefore, when contact-substances are used with or without the addition of steam, the gas is preheated and the furnace temperature is maintained sufficiently low to avoid rapid deterioration of the container and fusion of the contact-mass, if this be fusible—for instance, when iron or nickel is used as contact-mass, at 400° to 450° C.; although he does not wish to limit himself to this precise temperature. The preheating may be effected either in the furnace itself, in which case it is advantageous that the

arrangement should be such that the gas becomes heated to a temperature amounting to about 80 per cent. or higher of the temperature of the furnace.



Evans's Gas-Purification Apparatus.

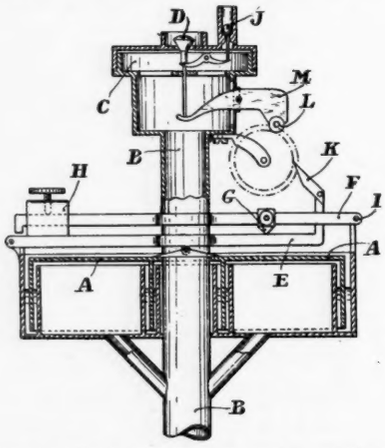
A suitable arrangement is illustrated in longitudinal vertical section through part of a furnace chamber A containing the apparatus for preheating the gas and converting the sulphur compounds. The gas enters the apparatus through the pipe D, and travels through a number of iron pipes B (of comparatively small diameter) situated in the furnace chamber. These pipes open into a collector E in communication with the container C, which is an iron pipe considerably wider than any of the pipes B, and likewise situated in the furnace chamber. The container contains pieces of firebrick which have been saturated with a nickel salt solution and then dried. The gas having been thoroughly preheated before entering the container, a furnace temperature of about 450° C. suffices; and the gas passes away at F containing its sulphur almost completely in the form of sulphuretted hydrogen. When it is found that the nickel compound is becoming insufficiently active, the current of gas is stopped, and the plugs G and H are removed from the ends of the pipe C, so that a current of air is maintained by natural draught through the pipe, whereby the contact-substance is revivified.

Automatic Igniting and Extinguishing Devices for Gas-Burners.

LIED, O. S., of Christiania, Norway.

No. 3019; Feb. 6, 1911.

This invention relates to an automatic igniter and extinguisher wherein the burner-valve is alternately opened and closed by increasing the pressure on a lifting member—such as a diaphragm, floating-bell or piston—transferring its movement through a loading lever to valve-operating mechanism; the movement of rotation, and consequently the loading force of the lever, being varied (if required) by



Lied's Automatic Burner Lighter and Extinguisher.

providing the lever with an adjustable weight. The object aimed at is to provide a device which will allow of varying the load exerted on the lifting member within very wide limits. For this purpose, a second pivoted loading lever and an adjustable pressing-piece form a load-translating member between the two levers. When this piece is displaced in a longitudinal direction along the levers, the loading force is quickly and easily varied.

In the illustration, the floating-bell A is, by means of a pipe B and branch pipes, connected with the gas supply pipe. The pipe B is further connected with a valve-chamber C, in which a valve B opens or closes the opening leading to the burner mounted above. The movable member A subjected to the gas-pressure is in operative connection with two oscillating levers E F; the former being also connected with the valve-operating mechanism shown, while the lever F serves for adjusting the member A in the following manner.

The gas-pressure tends to lift the bell, which is very light. The hinged lever E lies above the bell and rests upon two rollers at its middle portion. Above the lever E is the lever F, which is also hinged, and which by an adjustable pressing-piece G acts on the subjacent lever acting again on the rollers of the bell. The lever F, besides, has an adjustable weight H. The pressure on the bell from the loading mechanism thus depends upon the position of the piece G between the two levers. The further this pressing-piece is removed from the fulcrum I, the less the pressure on the rollers—*i.e.*, the less is the bell loaded, and *vice versâ*, when the pressing piece is moved towards the point I.

In addition to forming a member of the loading mechanism, the lever E serves to cause the opening or closing of the burner-valve D, and eventually also of the pilot-light valve J. For this purpose, the lever, through a pawl K and an ordinary ratchet and cam wheel, operates a roller L carried by the lever M. The latter is secured gas-tight in a flexible material forming one wall of the chamber C, and enabling the lever M to move as required on its pivot without the use of slide-surfaces, stuffing-boxes, or the like.

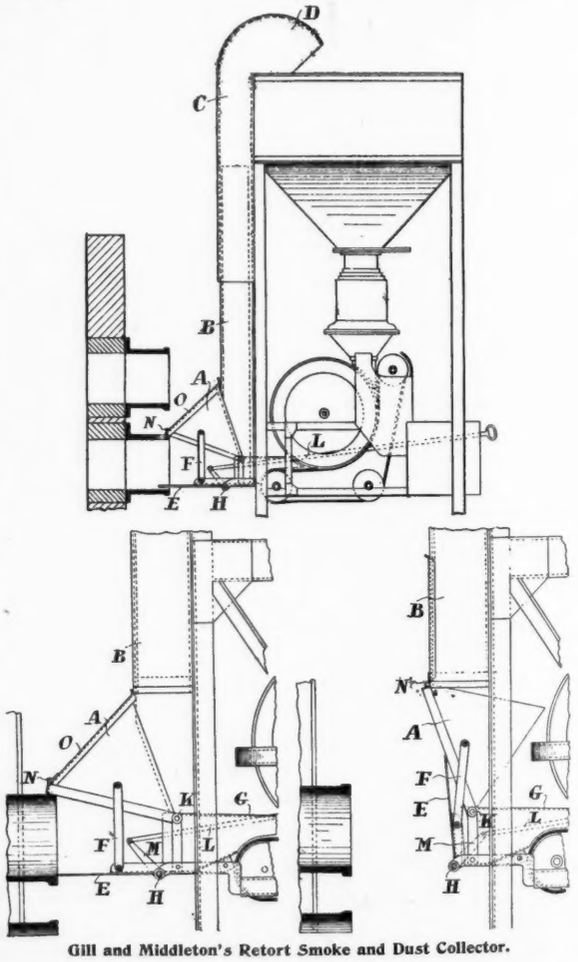
The stem of the main valve D (guided by a cross-piece) is connected through a double lever with the stem of the pilot-light valve, so that the latter is closed when the valve D is opened, and *vice versâ*.

Charging Gas-Retorts.

GILL, G. M., of the Commercial Gas-Works, Wapping, and MIDDLETON, A., of Commercial Road, E.

No. 2392; Jan. 30, 1911.

This invention has for its object to collect and deal with the dust and smoke caused by the charging of retorts with coal by machinery, by providing a telescopic chimney and hood, so that the hood can be adjusted over the mouth of the retort being charged and the smoke and dust collected and delivered to the chimney to be carried away to any desired place.



Gill and Middleton's Retort Smoke and Dust Collector.

The telescopic chimney is arranged so that the machine can be set at any required height, with a hood at the lower end for collecting the smoke and dust. At the top, the chimney is turned over to deposit the dust in the hopper of the machine or as desired. The coal being projected into the retort causes a displacement of hot air, which leaves the retort and is collected in the hood of the apparatus and rises naturally up the chimney. The draught caused carries along the smoke and dust made during the operation of charging, and deposits it in the

hopper of the machine or in some suitable receptacle. The telescopic chimney may be fixed on the framework of the stoking machine, and is made adjustable in height to suit the height of the machine when charging the different rows or tiers of retorts.

The illustration shows a side elevation of the apparatus; an enlarged detail of the lower part; and the apparatus closed up and out of action.

The hood A is shown in the first two views let down resting on the top of the mouthpiece of the retort ready for catching the smoke and dust caused by the operation of charging the retort. The smoke and dust collected in the hood now have a clear vertical path up the chimney B C, the lower part of which is made telescopic to allow for the operation to take place at each tier of retorts. The top length of chimney (which is fixed) is fitted with a head D, curved in towards the hopper on the top of the machine, in order to deflect the smoke and dust into it. The hood is pivoted at K to the fixed shoot G, and is connected by the two links F to the hinged flap-plate E, so that the two close up out of action together. The hood is operated by the hand lever L, which is carried away behind the machine to some convenient place—motion being applied through the short lever M, which is fixed to the flap-plate E pivoted at H. The loose top-plate O of the hood is hinged at N, and slides vertically up the front of the chimney, being guided by its flanged sides, and is held in a vertical position by butt hinges that prevent the plate falling over towards the mouthpieces when in the last position shown.

Converting Sulphite of Ammonia into Sulphate.

Burkheiser, K., of Hamburg.

No. 12,227; May 20, 1911. Date claimed under International Convention, May 21, 1910.

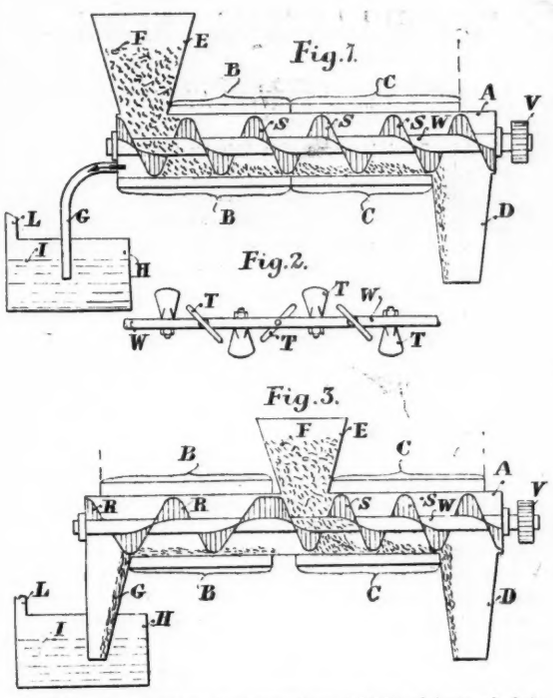
It is known, says the patentee, that sulphurous compounds in general, if left exposed to the air or if submitted to the action of air, are transformed into sulphates. It is also known that sulphite of ammonia is converted into sulphate of ammonia by bringing it into contact with the oxygen of the air. This conversion is generally effected by bringing a solution containing sulphite of ammonia into contact with air, or by spreading the precipitated salt and conducting air over it. As numerous experiments have shown, however, it is not possible to convert by such means the whole of the sulphite into sulphate. "In a surprisingly short space of time a state of equilibrium is reached between freshly-formed sulphate of ammonia and sulphite of ammonia which remains unchanged, which state is not materially changed even if air be introduced into, or conducted over, the mixture for a considerable length of time. This state of equilibrium is regularly reached when about 60 to 65 per cent. of the sulphite of ammonia has been converted into sulphate; so that the mixture still contains 35 to 40 per cent. of unchanged sulphite. The conversion of the pure sulphite of ammonia into a mixture of about two-thirds of sulphate of ammonia and one-third of sulphite of ammonia is accomplished very quickly and even unintentionally during the regular manufacture of sulphite of ammonia; the manufacture of an absolutely pure sulphite of ammonia being possible only under absolute exclusion of all free oxygen both during the manufacture and during the subsequent storage. It is, therefore, impossible to produce pure sulphite of ammonia by means of the customary process of manufacture. The product obtained will always consist of about one-third of sulphite of ammonia and two-thirds of sulphate of ammonia—the latter being formed even undesired during manufacture or storage if access of air is not impeded. On the other hand, this condition of equilibrium between the sulphite of ammonia and the sulphate of ammonia will not change materially, even if air is intentionally made to act on the sulphite for a long time."

The present invention relates to a method of converting sulphite of ammonia completely into sulphate of ammonia—consisting in continuously separating the sulphate of ammonia freshly formed under the action of the air, during and after its formation, from the sulphite remaining unconverted; in then oxidizing the latter; again separating; and, so on, until the whole of the sulphite is converted into sulphate. The separation by the new method may be effected by utilizing the differing properties of the sulphite and the sulphate of ammonia as (for example) their different solubilities or the property of the sulphite to sublimate at temperatures below 100° C. The patentee proceeds to describe a method of carrying out the latter process together with an apparatus adapted for the method, and which admits of continuous working until the whole of the sulphite of ammonia has been converted into sulphate of ammonia.

Fig. 1 is a diagrammatic representation of the arrangement for conveying the charge by means of a worm conveyor to one side of the apparatus; the arrangement being shown in longitudinal section. Fig. 2 is a conveyor in which the worm is composed of single vanes fitted to a shaft. Fig. 3 is a conveyor with right and left handed worms.

The arrangement shown in fig. 1 consists of a conveyor body A of long, tubular shape, surrounded along its front part—say, to about one-half of its length—by a cooling jacket B, and along its rear part by a heating jacket C. Through the cooling jacket is passed a cooling medium—such as cold water or cool air, for example; and through the heating jacket a heating medium—such as hot water, hot air, or steam. The part of the tubular body surrounded by the heating jacket is to be heated to such a temperature that the sulphite of ammonia will be sublimated with certainty, whereas the part surrounded by the cooling jacket is to be cooled so far that the vapours of sulphite of ammonia are again condensed on its walls. In the centre of A is rotatably journalled a worm conveyor S, the shaft W of which is driven by a pulley V in such a direction that the worm conveys the charge F from left to right. At the left-hand end—that is, at the coldest part—is arranged a funnel-shaped hopper E for the introduction of the charge, and at the right-hand end is provided (below) a funnel D. From the lower side of the front cooled end of A a pipe G leads to a suitable depth into liquid in a tank H, from the top of which an air suction pipe L leads to suitable suction apparatus.

The arrangement operates in the following manner: The sulphite of ammonia (or, better, the mixture of sulphite and sulphate of ammonia) is charged into the hopper E and conveyed in thin layers by the worm conveyor S from left to right in A. By the rotation of the worm, the particles of salt F are continuously agitated and thereby intensely exposed to the action of the current of air rushing in an opposite direction. The air required for the oxidization of the sulphite of ammonia is aspirated through the suction pipe L by suitable apparatus; and the air thereby rushes through A from right to left, and comes into intimate contact with the layers of the charge between the threads of the worm. In this way, the sulphite of ammonia introduced is converted as far as possible into sulphate of ammonia. The air then passes through the pipe G into the liquid in the tank H, where it is washed, before being drawn off through the suction pipe L. The sulphite of ammonia which remains unconverted in A is sublimated on the hot walls C. The sulphite vapours thus formed are carried by the current of air rushing through A to the left, and are again condensed on the cooled walls B as sulphite (or as a mixture of sulphate and sulphite), from which walls they are scraped off by the sharp edges of the worm conveyor S, and again conveyed with the charge introduced afresh to the right, to be here again oxidized and separated; while such particles of sulphite vapours or sulphite solution which are carried by the current of air through the pipe G are retained in the liquid in H, to be subsequently treated and recovered. The charge, which finally passes to the right and is discharged through the funnel D, consists of pure sulphate of ammonia only.



Burkheiser's Apparatus for Converting Sulphite of Ammon'a into Sulphate of Ammonia.

The constructional form shown in fig. 1 is diagrammatic only. It is obvious that the tubular body A and the worm S must be made of considerably greater length so that the charge F is exposed to the oxidizing current of air as long as possible. On the other hand, also, the hot walls C and the cold walls B respectively have sufficient time to act on the sulphite so as to completely sublimate it and free the sulphate formed in the latter part of A entirely of all sulphite, and to give the sulphite vapours carried back by the current of air sufficient time to condense on the cold walls of the jacket B, so far as this should not yet have occurred on the cooler freshly supplied salt charge F.

The worm conveyor shown in fig. 2 differs from that shown in fig. 1 only in that single vanes or blades T are fitted to the shaft W in place of one continuous worm.

While the arrangement shown in fig. 1 is intended to convert, as far as possible, the whole charge introduced into the hopper E into sulphate of ammonia, wherein the sulphite not at first converted is sublimated on the hot walls C and subsequently condensed on the cooled walls B, and is again and again brought (together with the fresh charge F) under the action of the current of air, until the whole charge is converted into sulphate, the arrangement shown in fig. 3 is intended to obtain a more rapid separation of the sulphate produced from the not yet converted sulphite. Here the hopper E is arranged about in the middle between the ends of the tubular body A. The worm conveyor has a right-handed spiral S, which receives and conveys the whole charge F from the hopper E to the right, and a left-handed spiral R which only scrapes the condensed sulphite from the cooled walls B and conveys it to the wide mouth of the discharge pipe G. In this arrangement, the part of the tubular body A to the left of the hopper E is surrounded by the cooling jacket B, and the part to the right by the heating jacket C. The operation of this arrangement differs from that of the arrangement shown in fig. 1 in so far as in this case only the part of the charge F is recovered which has been converted during one operation into sulphate of ammonia, while the sulphite sublimated on the hot walls, carried off to the left by the current of air, and here condensed on the cold walls B, is conveyed into the tank H. Here the solution is further oxidized, as far as this has not been effected by the current of air; and the solution thus obtained is again mixed with the mother lye obtained in the manufacture of the salt, and further used.

MISCELLANEOUS NEWS.

FIFTY YEARS' SERVICE AT RUGBY.

The Reminiscences of a Veteran Secretary.

Octogenarian, fifty years Secretary of the Rugby Gas Company, upright, alert, with mental capacity unimpaired, and taking a live interest in the affairs in which he has participated so long, sat Mr. T. M. Wratislaw to the right-hand side of the Chairman of the Company (Mr. A. J. Lawrence) at a little informal dinner at the Hotel Cecil last Wednesday. Others present included the Vice-Chairman (Mr. A. G. Chamberlain) and Messrs. I. Brooks, C. J. Elkington, J. B. Gray, Alderman J. Watson, all Directors of the Company. Also of the little party were Mr. Charles Meiklejohn, the Engineer of the Company, and the Assistant-Secretary (Mr. M. E. T. Wratislaw). The occasion was a special one. Mr. T. M. Wratislaw has almost reached the jubilee of his connection with the Company as Secretary: and the Chairman and Directors, his colleague the Engineer, and the shareholders, had determined not to let such an event pass without giving some tangible expression to their regard, which should also stand as a lasting memento of the long years of official connection with the Company. No other living man's memory goes back so far in the internal history of the undertaking as does that of Mr. Wratislaw; and therefore to all others associated with the Company, he stands in a peculiar position—uniting, as he does in his person, the distant beginnings of the concern with its present mature and still developing conditions. The "tangible expression of regard" and the memento, it was resolved, should take the form of a silver rose-bowl and a portrait of the recipient in oils. The portrait is not quite finished, but the rose-bowl was presented after the dinner last Wednesday. It is a beautiful and chaste representation of the silversmith's art. The bowl is mounted on an ebony stand, and bears the following inscription:—

PRESENTED
(Together with his Portrait in Oils)
to
THEODORE MARC WRATISLAW, ESQ.
by the
DIRECTORS OF THE RUGBY GAS COMPANY
to Commemorate the Completion of Fifty Years,
as Secretary, in the Service of the Company.
1861-1911.

Dinner finished, the Chairman proposed the loyal toasts, and then that of the "Rugby Gas Company" followed. Succeeding came the event of the evening.

The CHAIRMAN said it had been his pleasure on more than one occasion, during the thirty years he had been connected with the Rugby Gas Company, to have very felicitous duties to perform; but he did not think there had been a more pleasurable occasion than the present, when he had the great honour of undertaking a duty which gave not only himself, but everybody at the table, the greatest possible delight. It was given to very few men to have lived to eighty years of age, and to have been connected with one Company for more than fifty years. But they had with them a gentleman, in the person of their Secretary (Mr. T. M. Wratislaw), representing these facts. They were extremely glad to welcome him. He linked the distant history of their Company with the present. He did not want in any way to be reminded of those with whom he was early associated in the Company, and whom he knew so well—Mr. Wells, Mr. Gates, Mr. Edmunds, Mr. White, Mr. Haswell, and many others. On the 7th of next month Mr. Wratislaw would, according to the annals of the Company, have reached the fiftieth anniversary of the day on which he was made Secretary. As he (the Chairman) had said, it was given to very few men to live to see their jubilee in one official capacity; and they all congratulated Mr. Wratislaw very heartily. Such an event could not be overlooked by the Board and the shareholders of the Company, and those with whom Mr. Wratislaw worked; and though they were anticipating the date a little, they had determined to present him with a small memento of the occasion, and of the great regard in which he was held. They therefore asked him to accept the silver rose-bowl and the portrait with the best wishes of the Directors and of every shareholder of the Company. The rose-bowl had been filled with beautiful roses at the thoughtful wish and desire of their excellent Engineer's wife; and he (the Chairman) hoped that their fragrance would remind their veteran friend of those who revered him in Rugby. The Chairman read the inscription on the bowl, and, proceeding, said he hoped the portrait would be a good representation of their friend. He remembered some years ago being at the Incorporated Law Society; and after lunch in the Board-room, he saw the portrait of Mr. Wratislaw's ancestor. That portrait was the delight of their friend and of his brothers and sisters. He hoped the present one would be the same to Mr. Wratislaw's family. He asked him now to accept the rose-bowl, which was chosen with a great deal of deliberation and consideration, knowing the love of their Secretary for gardens and flowers.

The DEPUTY-CHAIRMAN remarked that he should like to supplement the words of the Chairman, because he had known Mr. Wratislaw for so long, and he could thoroughly appreciate that this was one of the proudest moments in his (Mr. Chamberlain's) life. Mr. Wratislaw knew thoroughly well what he meant. He was very pleased to congratulate him upon attaining his jubilee as Secretary of the Company; and he hoped they might all live to celebrate his diamond jubilee. This was one of those golden moments that occurred in every man's life.

Mr. WRATISLAW said it was hard work to open one's mouth to reply to such kind words as had fallen from the Chairman and the Deputy-Chairman. He desired to give to all with whom he had been associated in the Company, and were now with them, the right-hand of fellowship for all their kindness to him during the great number of years that he had been with them. Each man knew his own past best; and, knowing his own, he could appreciate the way in which they had been good enough to express and show their appreciation of his services. His memory went back to the very foundation of the undertaking, when a few gentlemen met together, and struggled to form a Company—a private partnership—by which, through the goodwill of the people themselves, the town of Rugby should be lighted by gas. The Company was formed in the interests of the town itself; and its conduct had ever been in the interests, not of the Company alone, but of the people. When the Company started, it drew its coal supply from the Midland wharf, and only kept a man and horse employed to cart the coal to the old works. The Company began with a very small capital, and with gas at 13s. 6d. per 1000 cubic feet;* and there was great rejoicing when there was a prospect of a reduction. For several years the Company paid no dividend, in order that they might be economical in its working, and endeavour to ensure its ultimate success. Looking at the present position, he felt sorry that many of those whose faces he remembered as pioneers of the Company and of the present prosperity were not among them that day. They had a share in the glory of its gradual progress in their day, as those who were associated with the present progress of the Company shared in its glory to-day. It was marvellous how the gas industry had increased; and it was still more marvellous how promising was its future. The industry had without interruption extended its success; and it would continue to do so. Every effort was being energetically and skilfully made by the scientific men of the industry to develop all economies in the work of the industry, in order to maintain, and raise, its position as one of the chief industries of the country, not only in lighting, but in heating, cooking, and power. It was a matter of national concern that the gas industry should prosper. He had had very great pleasure in working with Mr. Meiklejohn, who had, by his exceeding great industry and energy, developed the Company, and with a care that he had largely concealed and kept to himself. Not only had he rebuilt and remodelled the works, but he had and was extending the distribution system to the neighbouring villages, so fulfilling the duty the Company undertook when they obtained their last Act of Parliament. The Company had in its early years passed through many vicissitudes. But it had weathered them all; and the confidence in the Company was shown by the fact that, when last they went to Parliament, sanction was granted to an increase of the capital by £60,000, while the Company only began with a capital of £1500! Not only had the Directors always been full of zeal, but they had ever shown themselves willing, and wisely willing, to be guided by their engineers for the time being. They had all been engineers who had given great care and attention to the requirements of the undertaking. There were several; but he would only speak of one who was a good friend, and one whom they all loved. That was Mr. Peter Simpson—a self-made man. He lived in their memories the embodiment of uprightness, energy, and knowledge. Then they had Mr. Meiklejohn. In him, the Company had a valuable and talented engineer, as was not only shown by the success of the Company, but by the position Mr. Meiklejohn held among the gas engineers of the country. He trusted his friend might long be spared, as well as his wife and children, to enjoy the position he had gained for himself by gradually stepping up the ladder of the industry. Indeed, he firmly believed Mr. Meiklejohn had a future for yet higher things in the industry. He (Mr. Wratislaw) thanked all who had joined in this presentation. He wished he could find words with which to express his thanks, as they deserved to be expressed, for their kindness. But he did feel most sincerely the kindness to him. He wished all his friends present a happy future. And he hoped that the words of their mouths would abide in their hearts, and would always be a perpetual spring there. The happiness of that would bring greater happiness hereafter.

The VICE-CHAIRMAN remarked that the Chairman had asked him to propose the health of their Engineer. He did so with the greates pleasure; and at the same time thanked him for the arrangements he had made for this occasion. He hoped that Mr. Meiklejohn would be long spared to the Company; and that the future of himself and his household would be richly brightened in every way.

Mr. MEIKLEJOHN, in reply, observed that having only put in rather more than nineteen years in the service of the Company, he seemed to be, in comparison with Mr. Wratislaw, a mere apprentice at the job. But the happy time and experience he had had in connection with the Company's affairs, working with Mr. Wratislaw, made him think of one or two things in contemplating that evening. He did not think they had had, during the nineteen years he had been the Company's Engineer, any serious difference. What little difference had arisen had been, he was quite sure, due to his own folly. [Laughter.] He had probably been apt to think that what was the best possible thing for himself was the best possible thing for the Company; and possibly sometimes Mr. Wratislaw—and he (Mr. Meiklejohn) thought that his friend was right—considered that what was the best possible thing for the Company was not necessarily the best possible thing for its Engineer. [Laughter.] However, the final result had been so happy that, were it in his own power to determine, he would be quite willing to give Mr. Wratislaw a renewal of his "lease" for seven, fourteen or twenty-one years at his own option. He hoped that one of Mr. Wratislaw's best recollections would be the pleasant relations that had existed between himself and the Directors and the officers of the Company. He hoped their friend would live long and die happy.

Mr. ELKINGTON proposed the health of the Chairman and the Vice-Chairman; and both gentlemen having replied, a pleasant occasion and function was brought to a close.

* The price is now 2s. per 1000 cubic feet net, and will be reduced to 1s. 10d. next January. The price for power to large consumers will be 1s. 7d.

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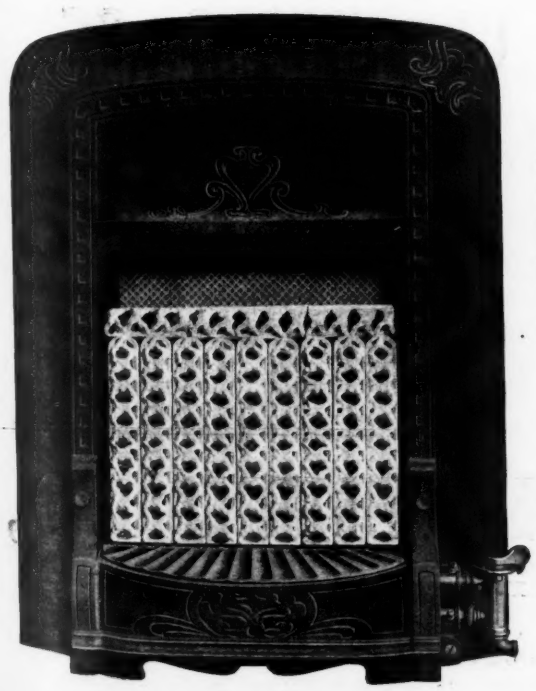

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HASTINGS AND ST. LEONARDS GAS COMPANY.

The Ordinary General Meeting of this Company was held on the 7th inst., under the chairmanship of Dr. G. G. Gray, J.P.

The Chairman, in moving the adoption of the report and accounts, said they showed very satisfactory working for the half year to June 30; there being a profit balance of £14,559. A few months ago, he commented on the fact that the profit balance was the largest the Company had ever had; but he ventured to suggest that they could hardly expect to always obtain such a satisfactory profit balance. The profit balance on the present occasion was not quite as large—a difference of about £12—but the balance to which he had referred was on the winter work. The present profit balance was the largest ever made in the June period. Compared with the corresponding half year, the present profit balance was practically an increase of £1500. This increase was due to several causes. It was due to some extent to an increase in the amount of gas sold—about 5¼ million cubic feet. This increase, he admitted, was not equal to that which they saw in some other towns, which were developing in a way in which the recent Census and other facts showed Hastings was not at the present time developing. But they had every reason to be satisfied; and their percentage of increase was equal to that of the South Metropolitan Gas Company. There had been a steady increase—almost unbroken—since they last went to Parliament; and the quantity of gas now sold compared with then showed an increase of 75 millions. Another reason for their position was the improved market for the sale of residuals; but it was really due, he thought, to the greater knowledge and observation of essentials in carbonizing, so that they obtained the greatest yield from the coal. This was a source of increase which he thought might in the future give even better results. He pointed out the improvement due to the care of Mr. C. E. Botley in the matter of carbonizing since he took over the works. The position was specially creditable to Mr. Botley as the head of the concern. Already to the revenue account there was a decrease of £348 due to the diminished quantity of gas supplied for public lamps to the Corporation. As to increases on the expenditure side, the share of the Company in promoting the Standard Burner Bill was £143. The net increased balance for the half year was £1496. They had written-off £2000 from the old works account, and £300 in respect to lamps which had been converted by the Corporation. About £100 of the £348 reduction by conversion of the lamps was profit. The cost to the town must have been £3 10s. per lamp (over £700), and an additional 3s. 6d. per lamp for light. Who benefited by the change was one of the puzzles which still remained to be solved.

Mr. A. W. Oke seconded the motion, and warmly complimented the Directors on their action with regard to the Burner Bill. Many companies, he said, now regretted they did not join in the promotion of the Bill. In commenting on the policy of the Corporation, he referred to the City of Berlin, where seven-eighths of the light was by high-pressure gas. He hoped those who had the administration of the electric light would look carefully into the accounts and see whether they were not deceiving the ratepayers.

The report and accounts were adopted, the statutory dividends were declared, and a hearty vote of thanks was accorded to the Directors and staff.

The Chairman, in his response, bore testimony to the excellent work of Mr. Botley and his staff. The chief burden, he remarked, was on Mr. Botley and his son (Mr. C. F. Botley), and those who worked under them.

Mr. Botley also expressed his thanks, and said he highly appreciated the confidence of the shareholders. Such results as they had obtained could not have been secured but for the loyalty and devotion of everyone connected with the undertaking. They did not mind any competition, so long as it was fair; but they could not fight against underhand competition. He warmly acknowledged the support he received from the Directors when he initiated steps over the burner question and other matters.

DOVER GAS COMPANY.

Addressing the shareholders of the Dover Gas Company at the half-yearly meeting, the Chairman (Mr. Willsher Mannering) expressed sincere regret at the death of their esteemed Engineer and Manager, Mr. Raphael Herring. He said that though Mr. Herring had been in failing health for some time, chiefly through heart trouble, the end was somewhat sudden. He had a seizure, and passed away on the evening of the following day. During the twenty-four years Mr. Herring was in charge of the works, he carried out his duties with ability and efficiency. He was thoroughly practical and devoted to his work; and with him duty was ever foremost. Mr. Herring interested himself largely in the welfare of the men, by whom he was highly respected; and his efforts on their behalf were much appreciated. It was at his suggestion that the reading and recreation room was established at the works in 1888; and he inaugurated the benevolent and death funds, which under his presidency had proved very beneficial to the members. By Mr. Herring's death, the Company had lost a loyal and valued officer, and the men a good master and a kind friend. All would sympathize with the widow and family in their bereavement.

Proceeding to move the adoption of the report and accounts and the payment of a dividend for the half year at the rate of 7½ per cent. per annum, the Chairman remarked that the six months to June had been very successful. There had been an increase of 2·04 per cent. in the consumption of gas; while residual products had realized unusually high prices. As compared with the corresponding period of the previous year, all items of income in the revenue account showed improvement. The balance carried to profit and loss account was £5452, as against £4823. After making the necessary deductions and paying the dividend, there would be a sum of £355 to add to the surplus profit

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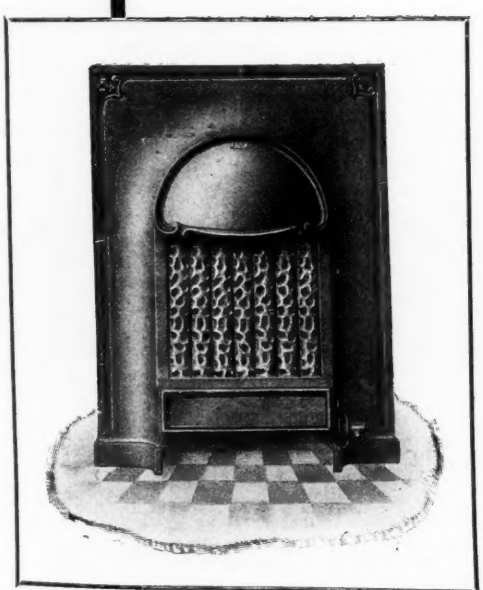

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balance of preceding years. He congratulated the proprietors on the result of the half-year's working, and on the strong position and continued prosperity of the concern. This depended largely on the interest, energy, and unity of the staff; and it was pleasing to testify to the satisfactory way the work had been done by one and all.

The resolution was carried, and the Chairman, Directors, and staff were thanked for their services.

The Secretary (Mr. E. C. Fielding), in acknowledging the vote on behalf of the officials, said that, on behalf of the employees, and more especially those who were under the late Mr. Herring's immediate supervision, he wished to join in with the expression of regret and sympathy at the loss of their Manager. While the late Mr. Herring's first cares had been for the prosperity of the Company, he always had a sympathetic interest in the welfare of the men under his charge.

WESTMINSTER TECHNICAL INSTITUTE.

We have received from the Principal (Mr. J. Stuart Ker, B.Sc.) a prospectus and time-table of evening classes for the forthcoming session of the Westminster Technical Institute of the London County Council, at Vincent Square, S.W. The following is the information under the heads, "Gas Engineering" and "Heating and Ventilation."

Gas Engineering.

TECHNICAL CALCULATIONS.

Mr. F. G. *Steed* and Mr. G. *Evetts*.

Tuesday, 7.15 to 9.30 p.m.

This half-session course of lessons, starting in September, is auxiliary to that of "Gas Supply and Manufacture," and should be attended by all students lacking in knowledge of the simple principles of calculation and mensuration so essential to progress in their technical studies.

Syllabus.—Decimal fractions, simple rules in calculation, percentages, proportion, contracted methods, including logarithms; metric system; calculation of areas, volumes, and weights; plotting on squared paper; illumination curves; gas-engine calculations; useful mechanical formulæ; calculations in connection with lighting and heating; mantle average; candle feet, &c.

A portion of the evening will be devoted to the working of examples under the supervision of the teachers.

TECHNICAL DRAWING.

Mr. F. G. *Steed* and Mr. G. *Evetts*.

Tuesday, 7.15 to 9.30 p.m.

This course will commence on the conclusion of the "Calculations" course, and is specially arranged for those attending the gas engineering classes.

Syllabus.—Simple geometrical principles; sketching from models and gas-fittings; plans, elevations, and sections; making finished drawings from rough sketches of gas appliances; tracing and printing; rolled steel sections in use; properties of materials.

GAS SUPPLY.—I.

Mr. P. *Smithers*, Mr. J. *Bevis*, and Mr. T. *Coghill*.

I. (*a*) Monday, 7.15 to 9.30 p.m. I. (*b*) Thursday, 7.15 to 9.30 p.m.

Lecture Syllabus.—Governors and their uses; general principles of distribution of gas; methods of laying and testing pipes and fittings; tools and appliances used; uses of pressure-gauge; principles and construction of gas-meters, their repair, testing, and fixing; interior fittings for houses and other buildings; construction of various forms of burners and their efficiency; regulation of gas and air supply to burners; inside shop window lighting; various types of low pressure, self-intensified, and high-pressure public lamps; fixing and construction of gas fires, stoves, &c., their defects and remedies; various systems of heating water by gas, and the principles of circulation; high-pressure distribution for lighting and industrial purposes; the gas-engine, its construction and efficiency.

Workshop Syllabus.—Cutting and screwing of barrel with various types of dies; bending of pipes, using forge or machine; joint blowing in lead pipe and compo. tubing; bending of lead pipe and meter fixing; drilling, tapping, and punching holes in barrel for float making; brazing forge work and fitting copper tube for illuminating devices; making lamp irons; fitting-up small gas-engine and high-pressure plant; testing various systems of hot-water heaters by experimental hot-water supply system; drilling holes in mains; cutting out and joint making.

GAS SUPPLY.—II. (*a*).

Mr. J. G. *Clark*.

Wednesday, 7.15 to 9.30 p.m.

Syllabus.—The subjects of the elementary courses will be considered in a more advanced manner, and in addition consideration will be given to the theory and practice of the flow of gas in mains, pressure recording instruments, specifications, testing for illuminating power and effect, gas in competition for light, heat, and power, important recent developments in gas engineering, &c.

GAS SUPPLY.—II. (*b*).

Mr. J. G. *Clark*.

Thursday, 7.15 to 9.30 p.m.

The special feature of this course will be laboratory work; and the students will have ample facilities for investigating the more important practical problems which arise in connection with modern gas supply, as, for instance: Calorimetry in its relation to gas and gas appliances, fires, cookers, grillers, &c.; practical photometry, measurement of candle power, mean spherical and hemispherical values of light sources; illumination of public thoroughfares and other aspects of gas lighting; the use of reflectors and shades; meter and governor testing; experiments relevant to the flow of gas through pipes.

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Flame temperature and its relation to the efficiency of gas appliances. The gas-engine in theory and practice; the use of the indicator; gaseous explosion.

Boosting and other aspects of pressure raising. The principles of ventilation and the hygiene of gas lighting and heating.

Any important developments and most recent practice in gas supply.

An experimental gas-engine and compressor are being added to the equipment this session.

GAS MANUFACTURE.

Mr. *Arthur Valon*.

Tuesday and Thursday, 7.15 to 9.30 p.m.

Syllabus.—The general arrangement of modern gas-works; properties of various kinds of coal and their value for gas-making purposes; simple physical and chemical principles involved in the ordinary processes of gas manufacture and the formation of bye-products.

Construction and setting of retorts and furnaces; methods of charging and discharging.

Effects of temperature on quantity and quality of gas; principles and methods of gas condensation; the exhauster, its construction and use; methods of removing impurities after condensation; instruments for recording pressure and exhaust; methods and apparatus for testing water gas, producer gas, and waste gas.

CLASSES FOR GAS-FITTER APPRENTICES.

Mr. *Steed*, Mr. *Jacques*, Mr. *Murison*, and Mr. *Winch*.

These classes are held by arrangement with the Gaslight and Coke Company, who select a number of lads each six months to be trained as gas fitters. A workshop has been equipped at Horseferry Road for the training of the lads in workshop practice, and they attend the Institute for instruction in technical drawing, calculations and elementary science, composition and précis writing on three afternoons a week in the first year of training, and on one whole day a week in the second year. During the third and fourth years of training, attendance will be given on two evenings a week at "Gas Supply" and "English" classes.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

President: Mr. J. G. *Clark*.

Arrangements have been made for the meetings of the Association to be held in this Institute on the fourth Friday of the months, October, 1911, to May, 1912, inclusive.

Papers of educational interest to gas engineers are read and discussed; visits to works being also arranged.

Particulars as to qualifications for membership, &c., can be obtained from the Hon. Secretary, Mr. E. Scears.

Heating and Ventilation.

Mr. A. H. *Barker*.

COURSE I.—Monday, 7.15 to 9.30 p.m.

Syllabus.—Use of slide rule or calculator; curves and their uses; heat, work, and energy; thermometric scales and their conversion; unit of heat; specific heat; air, its weight and expansion; properties of water and steam; conduction of heat; fuels, their properties, composition, and consumption; principles of combustion; boilers and chimneys; loss of heat from buildings; practical calculations; emission of heat from radiators and pipes, and quantities of water and steam necessary; non-conducting compositions; principles of hot water and steam circulation in pipes; pipe sizes in practice; heating by high pressure hot water, hot air, and electricity; ventilation; vitiation of air tests; humidity of air; quantity of air required.

COURSE II.—Friday, 7.15 to 9.30 p.m.

Syllabus.—A more thorough treatment of the subjects of Course I., and more detailed explanations of the carrying out of the principles in practice; elementary theory of the flow of fluids, air, and steam; theory of chimneys and their capacity; theory of boilers; principles of the fan; theory of pipe sizes; theory and practice of ventilation by all modern methods; air currents and analysis; Plenum systems; sizes and capacities of fans and ducts; long distance heating.

Experiments and tests will be arranged for illustrating all the principles.

OSWALDTWISTLE GAS DEPARTMENT.

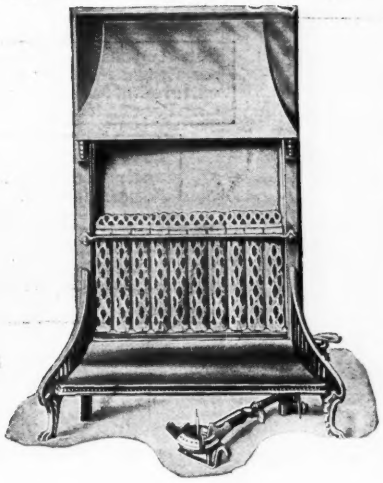
The Gas Committee of the Oswaldtwistle Urban District Council have received a very satisfactory statement from the Chairman (Mr. James Pilkington, J.P.) on the working of the Gas Department for the year ending March 31; the gross profit being £4807, and the net profit (after payment of interest on loans and sinking fund) £2873. This was the first full year in which the whole of the alterations made by the Engineer and Manager (Mr. J. H. Davies) had been operative; and considering that the net profit in 1907, when Mr. Davies was appointed, was £440, it will be admitted that the results now presented show the value of the changes made. When Mr. Davies took over the control, it is stated, Oswaldtwistle was threatened with a gas famine; but by dint of energetic effort and enterprise, he managed to steer through the winter. Since then the works have been practically reconstructed under his direction.

The gas produced was 67,058,000 cubic feet, and the coal carbonized 5698 tons; being a make of 11,759 cubic feet per ton of coal, as against 9721 feet in 1907-8. The gas accounted for amounted to 11,010 cubic feet per ton of coal; the leakage having been reduced in three years from 10·57 to 6·4 per cent. The net selling price of gas in Oswaldtwistle is 2s. 6d. per 1000 cubic feet, and 2s. for power users; and the net profit reaches the high figure of 11d. per 1000 cubic feet. The returns from residuals were 9s. 6d. per ton of coal carbonized.

In consequence of the improved results obtained, the Council have decided to increase the Engineer's salary by £75 per annum; this being the second increase in two years that Mr. Davies has received.

THE "RENAISSANCE."

THE "FLAMBEAU."



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SOUTHPORT GAS UNDERTAKING.

At a Meeting of the Southport Town Council last Tuesday, Mr. Trounson, moving the adoption of the minutes of the Gas Committee, referred to the annual report of the Gas Engineer (Mr. J. Bond). He said that one of the main features of the report (a summary of which appeared in last week's "JOURNAL") was that they had been able to contribute a sum of £13,000 out of the profits in aid of rates. The Committee were highly pleased with the result of the year's working, and he hoped the Council would be.

Attention was drawn by Alderman Shuttleworth to an increase in the unaccounted-for gas compared with the previous twelve months; the figures being 20,925,000 and 13,616,100 cubic feet respectively. He suggested that a good deal of the leakage was from the mains in Lord Street. The Parks and Improvement Committee lost from six to eight trees annually in this thoroughfare; and he attributed this to the escape of gas from the mains. The Gas Committee were about to lay mains in connection with the high-pressure gas-lighting scheme, and he thought it would be well to overhaul the existing mains while the streets were up.

Alderman Griffiths pointed out that the leakage was under 4 per cent., which was not a great amount.

It was the opinion of Mr. Ellison that, as the profits had been increased from £8000 a year to £13,000, the Gas Committee should take into consideration the question of reducing the price of gas. He thought if they brought the charge down to 2s. 4d. or 2s. 6d. per 1000 cubic feet, it would be a benefit to the ratepayers, and at the same time more gas would be used for domestic and other purposes, to the advantage of the Gas Department.

In his reply, Mr. Trounson said that the increased loss of gas did look, on the face of it, a big item, but the contributory causes had been many. One was the extra laying of mains. They had laid during the twelve months between two and three miles of mains more than in the preceding year. Another troublesome matter was that of stoppages, involving the opening-up of pipes. This had also resulted in a great loss of gas; but the difficulty had now been overcome. He was not sorry this question of the increase in the leakage of gas had been brought forward, because it gave him an opportunity of presenting a statement as to their losses of gas compared with other towns. In the previous year, the loss was 2·05 per cent.; and there were only four towns in Great Britain lower than this. In his opinion, this was a credit to the management of the Southport gas undertaking. The discussion that night was in regard to a matter of 3·83 per cent.; and there were few towns in the country which could show as low a leakage. The increase on the previous year was due to causes not likely to occur again; and he did not think the matter needed further explanation. As to the suggestion about the cheapening of the gas, for the present the Committee did not contemplate any change; but he did not think the time was far distant when the position of affairs in connection with the department would allow of a reduction. One of the reasons why they did not want to reduce the price was that their borrowing powers were nearly exhausted. This year they were paying £4000 towards reconstruction out of revenue; last year they only paid £1000; so they were gradually reducing their capital charges.

The minutes were confirmed.

IRONMONGERS AND MUNICIPAL TRADING.

At Birmingham.

A lengthy discussion took place at a meeting of the Birmingham Association of Master Gas-Fitters on the 4th inst. respecting a proposal of the Gas Department to supply and fix gas-stoves in private houses free of charge, subject to a quarterly rental of 1s. per stove. Some members favoured a protest against this further encroachment on the private traders' preserves; while others, believing that the department would eventually hand over the business to private traders, as was done in the case of gas-cookers, counselled a policy of patience. It was urged by some speakers that the business given out by the department was not fairly divided among the trade; and they said if the gas-stove work was to be distributed in the same unfair manner, they would have nothing to do with it. Finally, a resolution was adopted postponing further discussion of the matter.

At a meeting of the Birmingham Ironmongers' Association on the following day, a resolution was passed deprecating the free fixing of gas-stoves in private houses, and expressing the hope that the practice would be discontinued. It was agreed to send copies to the Secretary and the Chairman of the Birmingham Gas Committee. Mr. J. H. Meakin (the President), in moving the resolution, said it was absurd that tradesmen should be obliged to pay 2s. 4d. per 1000 cubic feet for their gas so that the Committee might "give gas-stoves away."

The resolution was adopted after the reading of a letter sent to the meeting by Mr. Harry Smith, who was unable to be present. In the course of this communication, the writer said:—

> Nearly every gas-fitter and ironmonger sells gas-fires—some more, some less; but whoever sells a stove generally gets the job of fixing it. Under the scheme now being introduced, he will be done out of his job; and a grievous wrong will be inflicted upon all tradesmen dealing in gas-fires, without benefiting anybody. It is morally certain the poorer class of citizen, whom such an arrangement might conceivably benefit, will not reap any advantage, because they are the last people to require gas-stoves for heating purposes. The ironmonger will not only lose the sale of the stove and the opportunity of fixing it, but he will lose the chance of selling the customer other things besides.

A strong reason why any further extension of municipal trading should be opposed is that it brings manufacturers too completely

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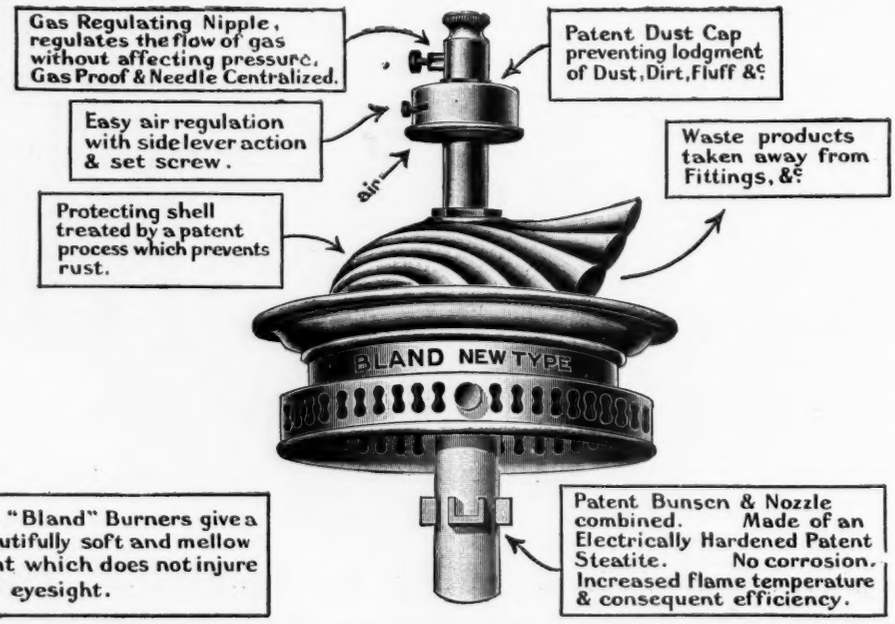
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under the control of the municipalities, and renders them liable to a species of intimidation and blackmail. At a meeting, recently of shareholders in a company manufacturing gas appliances, the chairman asked the shareholders to confirm the purchase of certain shares from an official employed in a certain gas department at a figure considerably higher than the market value. The chairman explained that the company had been obliged to purchase the shares because the official referred to had threatened them, in the event of their refusal to do so, with a loss of business. Transactions of this sort showed that there were serious dangers for manufacturers as well as retailers in the municipal trading system.

If the scheme recently adopted by the Birmingham Corporation is carried out and adopted by other towns, manufacturers and retailers throughout the country will eventually suffer; and it behoves them in this matter to stand shoulder to shoulder and resist the infliction to the uttermost.

At Manchester.

The decision of the Manchester Gas Committee to supply and fix on simple hire, or on the three years' purchase system, gas-fires and "other gas-consuming devices"—a scheme approved by the City Council at the last meeting—has caused considerable perturbation among the ironmongers in the city and suburbs. What troubles these traders most is the possibility that the supply of "other gas-consuming devices" by the Corporation Gas Department may mean in the end an extension of municipal trading that will seriously affect their trade.

At a meeting of the Manchester, Salford, and District Ironmongers' Association, held at the Grosvenor Hotel, Manchester, last Tuesday evening, the matter was brought forward for discussion; being introduced by Alderman Wilson, who, in the course of his speech, declared that the carrying out of the Gas Committee's scheme would mean that the private trader would be seriously handicapped in his business.

After the subject had been discussed at some length, a resolution was passed protesting against the adoption of the proposal, and pointing out that, in the opinion of the members of the Association, a great injustice would be done to ironmongers, who would have their legitimate trade filched from them by the Corporation. It was stated that many ironmongers stocked gas-consuming appliances, and therefore it would be unfair for the Corporation to enter into competition with such traders, who were also ratepayers in the city. By a further resolution, it was decided that a letter embodying these views be sent to Alderman Gibson, the Chairman of the Gas Committee, and a copy of the resolution of protest forwarded to the Master Plumbers' Association, so that joint action may be taken in regard to the matter.

There is to hand from Messrs. Falk, Stadelmann, and Co., Limited, of Farringdon Road, E.C., a copy of their new "Veritas" incandescent light catalogue, which contains illustrated particulars of a large number of mantles, burners, globes, chimneys, and sundries.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It was a very pretty gathering which was held of the Western District of the Scottish Junior Gas Association in the Scottish Exhibition this afternoon. This was the first occasion on which I had seen ladies at any assemblage of Juniors. Of course, the business of the day suited them; and it was this knowledge which, I have no doubt, led to their being invited. There was more to be seen in the gas lighting section of the Exhibition than might have been anticipated. Of course, it is all high-pressure lighting, except the ornamental illumination; and as high-pressure lighting is a thing not to be seen everywhere, the attendance of visitors was very large. It was a happy thought which led to the opening up of a compressor, so that the members might have a better understanding of the internal arrangements of the apparatus. The description of it given by Mr. R. Milne was equal to an illustrated lecture on a scientific subject. The members got more information in the course of fifteen minutes at Messrs. Milne and Sons' stand than they would have obtained in a whole day's reading.

We are again to have a question relating to the valuation of the Edinburgh and Leith gas undertaking carried through the Valuation Courts. It was generally thought that the decision given two years ago was final and decisive; but it now appears that this was not so. The present process was first heard of in the Valuation Court for Leith, which was held on Tuesday. The Gas Commissioners sought that the valuation of their undertaking, so far as situated in Leith, should be reduced from £3303 to £3051. Mr. Duncan Millar, who represented the Gas Commissioners, said the sum involved was only £252, the rates upon which amounted to £25 5s. 10d.; but there was a much more important question affecting the valuation of the undertaking in Edinburgh, which had yet to be discussed in the Valuation Court there. The point raised was whether in applying the principles which were laid down by the Judges in the Commissioners' case two years ago, for the valuation of undertakings which were non-profit earning, the whole expenditure was to be deducted, without distinction as to what were landlords' and what were tenants' expenditure. The Commissioners maintained that all expenditure was to be deducted. The Burgh Assessor—Mr. G. Simpson—stated the method of arriving at the valuation adopted by the Assessor for the City of Edinburgh, and acquiesced in by himself and the Assessor for the County of Midlothian, to be based upon interpretations of the different decisions which had been given. From the gross revenue there was deducted the expenditure, including sums paid in respect of feu duties and landlord's taxes. An allowance of 5 per cent. was made on half of the balance, as representing working capital, and a like allowance on the value of movables, &c., as representing tenants' capital. The balance was fixed as the assessable rental. The decision in the Leith case is to be given next week. The Edinburgh case has not yet been heard, nor has that

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of Midlothian. The claim in Edinburgh will be for a reduction of the valuation by £8282, and in Midlothian by £192.

The Dunfermline Town Council on Monday resolved, in view of the litigation which is proceeding as to patent rights in vertical retort-settings, to delay consideration of a proposal to introduce vertical retorts into their gas-works. The same course was adopted with reference to the negotiations regarding the introduction of gas from Dunfermline into the town of Culross. In entering upon this matter, the Town Council had in view the supplying of gas to places *en route*. One of these places was Valleyfield, a rapidly growing village belonging to the Fife Coal Company, Limited. Negotiations were so far advanced that the Corporation of Dunfermline gave an order for the supply of pipes, and some of these have already been delivered. The difficulty which has arisen is that the Fife Coal Company are proposing to erect a small works to supply gas to their own tenants in the Valleyfield district. This proposal would detract from the profit-earning capacity of the Culross scheme, and, accordingly, the Convener of the Gas Committee sought a continuation of the remit to them of the subject. He explained that the Manager of the Fife Coal Company had declined the terms they offered. The Gas Committee, in view of the situation which had arisen, asked that the remit be continued in their hands. The suggestion of the Committee was adopted.

The Arbroath Town Council on Monday considered the report of a Sub-Committee which was appointed in June last to inquire regarding a proposal by the Manager—Mr. A. C. Young—that the illuminating power of the gas might be reduced. The Sub-Committee reported that they had received information from 14 towns in which the illuminating power had been reduced—in seven of them to 14 candles, in four to 15 candles, and in the other three to 16, 18, and 20 candles respectively. Mr. Young had pointed out to them that, as there was likely to be an increased demand for benzol, he was strongly of opinion that it was advisable to be independent of the use of it. This would save gas consumers in Arbroath about £500 a year. Mr. G. R. Wallace, the Convener of the Gas Committee, moved that a Provisional Order be applied for, to authorize the reduction of the illuminating power from 20 to 14 candles; and also conferring additional borrowing powers upon the Corporation to the amount of £15,000. Provost Alexander seconded. The proposal was opposed in the Council, on the grounds that a Provisional Order, even if unopposed, would cost £500, and that the lessening of the illuminating power would not be satisfactory in Arbroath, any more than it had been in other towns where it had been tried. The motion was carried by sixteen votes to two.

It took the Perth Town Council more than two hours on Monday to make up their minds as to whether or not they would provide stoking machinery for the gas-works. A similar proposal was rejected by the Council a year ago. Since then a change had been made in the convenership of the Gas Committee, and the new Convener—Mr. J. Clark—again brought the subject forward. The proposal of the Gas Committee was to procure a De Brouwer charging and discharging machine, to be driven by electricity. The cost of the new plant was estimated at £3900. Mr. Clark, in support of the recommendation of the Gas Committee, said it was estimated that the gross annual saving would be £1062, of which £614 would be on account of the increased yield of gas per ton of coal, and £448 would be the saving in labour. They would also have a better yield from residuals. It would not be necessary to add to the debt of the department, as they had an emergency fund which was quite capable of dealing with the matter; and he thought that the resources of the Gas Department were such that they would be able to again build up this fund. He hoped that in the near future they would be able to reduce the price of gas to 2s. 6d. per 1000 cubic feet. The resources of the Gas Department were improving, the price of gas was cheapening, and the capital burden on the department was being gradually lightened. The party opposed to the introduction of machinery expounded at length; but the views of only one need be noticed—those of ex-Lord Provost Cuthbert, himself in his day a respected Convener of the Gas Committee. Mr. Cuthbert could not bring himself to support the introduction of stoking machinery. He was a member of the old Gas Committee. In those days it was purely hand labour, which was far more satisfactory than the mechanical labour of the present day. He was very anxious that they should have a report before they considered definitely the question of the introduction of the De Brouwer machine, or the possibilities of the vertical retort. Vertical retorts, he went on to say, could be seen in operation in Glasgow, and everything pointed in the direction of the vertical retort being the retort of the future. The Council, by 17 votes to 7, agreed to the recommendation of the Gas Committee.

The annexed advertisement has been published in several local newspapers this week: "Edinburgh School Board—Wanted, a Lecturer on Gas Lighting and Appliances, for the course to be provided in Leith Walk Continuation Classes for Gas-Fitters and those engaged in Gas Engineering and Supply. Salary at the rate of 3s. 4d. per hour." There seems to be difficulty in obtaining a lecturer upon this subject. Doubtless a better man is wanted than a three and fourpenny one. Any teaching such a man could give would be of little value; and unless the School Board are prepared to employ teachers with better standing than this advertisement seems to indicate they have in their mind's eye, had they not better leave the subject alone?

The Assessor for Kirkintilloch this year fixed the valuation of the Corporation gas undertaking at £2958—an increase of £958. Negotiation took place between the Corporation and the Assessor, as the result of which the increase was reduced to £400; making the valuation £2400—the Assessor stipulating that the valuation in future was to be on the basis he had adopted this year.

Bailie Wright, the Convener of the Gas Committee of the Kirkcaldy Town Council, reported to the Council on Monday the terms which had been agreed upon between the Committee and the General Manager of the North British Railway Company, for the supply of gas from Kirkcaldy to the railway station and yard at Thornton Junction. The Railway Company are to be supplied with gas on the same terms as consumers in Kirkcaldy, except that they are to receive less discount than is allowed to large consumers in Kirkcaldy, to the amount of 2½ per cent. The agreement is to be for ten years.

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CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 761.]

LIVERPOOL, *Sept.* 16.

Sulphate of Ammonia.

During the past week the market has been rather erratic, but on the whole the tendency has been towards an improvement in values. For the first day or two the tone continued dull, but later there was improved demand, and all available supplies found ready buyers at full prices, although the purchasing has principally been done by dealers who had previous sales to cover. The closing quotations are £13 18s. 9d. per ton f.o.b. Hull, £14 per ton f.o.b. Liverpool, and £14 2s. 6d. per ton f.o.b. Leith. There is nothing new to report with regard to future delivery; manufacturers maintaining their price at £14 5s. per ton f.o.b. at the best ports, while consumers steadily refuse to pay this figure.

Nitrate of Soda.

This article has become somewhat firmer on spot, and the quotations have been advanced to 10s. per cwt. for ordinary quality, and 10s. 3d. for refined.

LONDON, *Sept.* 18.

Tar Products.

The markets for tar products remain very firm. In pitch, there has been a fair amount of inquiry during the past week; but there is no change in prices. Creosote is in good demand, and prices are firm. Benzols are steady, with a fair amount of inquiry. Naphthas are steady; but business is quiet. Crude carbolic remains in about the same position; and consumers are willing to make contracts for next year's delivery at slightly under the prices mentioned to-day.

The average values during the week were: Tar, 21s. to 25s. *ex* works. Pitch, London, 40s. 6d. to 41s. 6d.; east coast, 40s. to 41s.; west coast, Manchester, 39s. 6d. to 40s. 6d.; Liverpool, 40s. to 41s., Clyde, 40s. to 41s. Benzol, 90 per cent., naked, London, 8½d. to 8¾d. f.o.b.; North, 8d. to 8½d. f.o.b.; 50-90 per cent., naked, London and the North, 7¾d. to 8d. f.o.b. Toluol, naked, London, 8½d.; North, 7½d. to 8d. Crude naphtha, in bulk, London, 4d. to 4½d.; North, 3½d. to 3¾d.; solvent naphtha, naked, London, 9¼d. to 9½d. f.o.b.; North, 8d. to 8½d. f.o.b.; heavy naphtha, naked, London, 10¼d. to 10½d. f.o.b.; North, 9d. to 10d. f.o.b. Creosote, in bulk, London, 2⅛d. to 2 $\frac{11}{16}$d.; North, 2⅛d. to 2¼d. Heavy oils, in bulk, 2¾d. Carbolic acid, casks included, 60 per cent., east coast, 2s. to 2s. 3d.; west coast, 1s. 11d. to 2s. 2d. Naphthalene, £4 10s. to £9 10s.; salts, 42s. 6d. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

There has been a little more inquiry during the past week, although orders are reported to have been taken at slightly lower figures. Beckton prompt is still quoted £13 15s.; but outside makes could possibly be purchased at £13 7s. 6d. to £13 8s. 9d. In Hull, £14 is quoted; Liverpool, £14 to £14 2s. 6d.; Leith, £14 5s.; Middlesbrough, £14.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a very fair demand for coal from the north-eastern collieries; and though the lack of adequate steamers limits shipments, the trade is fairly good in volume and price. Best Northumbrian steam coals are 11s. per ton f.o.b., second-class steams are 9s. 6d. to 9s. 9d., and steam smalls from 4s. 9d. to 6s. The output is fair, and is well taken up. In the gas coal trade, prices do not show very great change. Best Durham gas coals are from 10s. 7½d. to 10s. 9d. per ton; second-bests are from 9s. 9d.; and for "Wear specials," about 11s. 6d. is the current quotation. As to contracts, there have been some sales of cargoes to the Mediterranean ports, at prices similar to those that have been quoted. The limited supply of steamers for the trade, which usually begins to be enlarged steadily at this season, is just at present keeping back the foreign trade, and allowing some home users to replenish their stocks. Coke is steady. Gas coke now begins to show a larger production, and is quoted from 14s. 3d. to 14s. 6d. per ton f.o.b. in the Tyne or the Wear.

Scotch Coal Trade.

Trade continues to be fairly active; the demand for export being still well maintained. Prices have kept firm. There is a good demand for small sorts. Prices are now quoted at: Ell, 9s. 9d. to 10s. 6d. per ton f.o.b. Glasgow; splint, 10s. to 10s. 3d.; steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 390,443 tons—an increase on the previous week of 62,472 tons, and on the corresponding week of 6056 tons. For the year to date, the total shipments have been 11,221,806 tons—an increase on the corresponding period of 148,514 tons.

Price of Gas at Newport (Mon.).—A reply to the application for a reduction in the price of gas has been sent to the Newport (Mon.) Gas Consumers' League by Mr. T. H. Hazell, the Secretary to the Gas Company. In this, Mr. Hazell points out that the Company made a reduction of 2d. per 1000 cubic feet before being approached by the League; and he says that if the alterations in the process of gas making now being carried out prove effective, the Company propose to give the public the benefit.

Bognor Gas Company.—The Bognor Gas Company's dividend for the past half year is 5¾ per cent., which is the full statutory payment. The revenue enabled the Directors to carry £2079 to the profit and loss account, though the capital had been increased by £4000. The new works were stated to be progressing satisfactorily, the extension mains were ready for supplying, and hope was expressed that the price of gas would shortly be reduced. Authority has been given for the raising of an additional £10,000 of capital.

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Flint Gas and Water Purchase Question.—The Flint Borough Council have decided to constitute themselves a Committee for the purpose of considering the advisability of acquiring the local gas and water undertakings. The Mayor (Major Dyson), who is Chairman of the Gas and Water Company, promised to render the Council all the assistance possible.

Concession in Price at Ventnor.—The Ventnor Gas and Water Company announce that they will allow a discount of 5 per cent. off all gas accounts of £1 and upwards as from the Michaelmas quarter, if paid within one month from the delivery of the account. This is equal to about 3d. per 1000 cubic feet, and applies to slot as well as to ordinary consumers.

Heywood Corporation and the Gas Publicity Scheme.—At last Wednesday's meeting of the Heywood Town Council, the minutes of the Gas Committee were confirmed without discussion. These included a resolution to the effect that the Heywood Corporation contribute to the Publicity Scheme of the Institution of Gas Engineers a yearly amount representing 2s. 6d. per million cubic feet of gas manufactured by the Corporation.

Cheaper Gas at Rochdale.—By a unanimous vote, the members of the Rochdale Gas and Electricity Committee have decided to recommend the Town Council to reduce the price of gas to ordinary consumers by 2d. per 1000 cubic feet, and to give users by automatic meter 27 cubic feet instead of 25 cubic feet for a penny. The charge to ordinary consumers will then be 2s. 6d., in place of 2s. 8d.; and this concession, with that to the slot-meter users, will mean a reduction of £3200 a year in the profit of the department. No alteration is suggested in the charges for gas used for power or heating purposes.

Municipal Undertakings at Salford.—Messrs. Robert Heatley and Co., professional Auditors to the Salford Corporation, in their annual report to the Council, point out that the depreciation and renewal funds have been depleted by the increased expenditure which, with the exception of the gas and water funds, is in excess of the contribution for the year. They add: "In view of the large capital outlay, we respectfully commend to the Committees the desirability of increasing the balances of these funds." The contribution from the Gas Department in aid of rates was £15,750, compared with £15,034 in 1910; and from the Water Committee the amount was £2072, compared with £953.

Stove-Rents at Burton.—At the monthly meeting of the Burton-on-Trent Town Council, Alderman Lowe moved a resolution to the effect that, commencing with the current quarter, no stove-rent be charged to consumers who have had the same stove on hire from the Corporation for five years or more, and that stove-rents be charged for the two summer quarters only to persons who have had stoves less than five years. After some discussion, Alderman Lowe said the Gas Committee were prepared to accept the substitution of "a" for "the same" stove, with the addition of the words "subject to a satisfactory report by the Gas Manager as to the user thereof." In this form the resolution was carried.

Strange Gas Poisoning Fatality.—A curious gas fatality was investigated some days ago by a Coroner's Jury at Derby. Florence Bray (20) was found one morning by her father in an unconscious condition near a small kitchen gas-stove, the tap of which was turned on and the india-rubber connecting tube partly broken. The girl was in her nightdress; and on recovering consciousness, she told the doctor she must have walked in her sleep. Later she became worse, and ultimately died from syncope following poisoning by coal gas. The Jury returned a verdict in accordance with the medical evidence, and added that there was no evidence to show how the deceased got into the kitchen or how the gas had been turned on. It appeared to be a mystery.

High-Pressure Lighting at Southport.—The Gas Committee of the Southport Corporation have almost completed details for the introduction of high-pressure gas lighting in the principal streets of the town; and it is expected that many of the larger business houses will take advantage of this opportunity of improving the illumination of their premises, externally and internally. Special mains are to be laid from the gas-works in Eastbank Street. The intention is to improve the illumination of streets other than where arc lamps are now used; and this will provide an excellent example of what can be done. A scale is being arranged by which shops, both inside and outside, can be lit at a fixed sum per annum; the cost being such as should induce people to discard even their present fittings.

Falmouth Gas Company.—It was reported at the annual meeting of this Company that the sale of gas had increased during the past twelve months by 2½ million cubic feet. Major Mead, the Chairman, said that with one exception the year was the best in the history of the Company since its formation in 1865. Of the increased consumption, one million cubic feet was due to ordinary consumers. As they had a strong competitor in the electric light, it was gratifying to know that the ordinary consumption was progressing in this way. The other part of the increased consumption was due to slot consumers and cookers. An interim dividend of 5 per cent. had been paid for the half year ending Dec. 31, and it was decided to pay a further dividend of 6½ per cent. for the six months ending June 30.

The Municipal Coal Supply Proposal.—When the minutes of the Gas Committee came before the Bradford City Council last week, Mr. Leach moved an amendment to one agreeing to the acceptance of tenders for the supply of house coal required by various departments of the Corporation for the ensuing twelve months. He proposed to amend this minute by adding the words "and the public" after the word Corporation. All progress which had been made in the interests of the citizens for a long time past, he said, had been in the direction of the enlargement of Corporation activities. The case for the extension of this principle had already been made out. Since he formerly advocated a system of municipal coal supply, the Bradford Co-operative Society had adopted it, with splendid results. He maintained that, in the interests of the poorer citizens, the change he suggested ought to be adopted by the Council. Mr. Geldard, in reply, argued that it was not the duty of the Gas Committee to buy coal for the people of Bradford, The amendment was defeated.

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The Directors of the Gas and Commercial Securities Corporation, Limited, have resolved to recommend a final dividend at the rate of 6 per cent. per annum, free of income-tax—making 5½ per cent. for the year to Aug. 31.

The Liverpool United Gaslight Company have made complete arrangements for the hiring-out of Richmond's "A. B. C." series of gas-fires at low rentals, to be fixed free and periodically inspected without charge to the consumer. A contract has been made with the Richmond Gas Stove and Meter Company, Limited, for the sole supply of their gas-fires for a number of years.

Under the title of "Frugals," there is being introduced on the market by Messrs. Leftwich and Co., of Camden Town, N.W., a device for assisting in economizing gas for lighting purposes. The arrangement is the subject of a patent, an illustrated abstract of the specification of which appeared in the "JOURNAL" for July 14, 1908, p. 117. The invention is also applied to gas cooking-stoves, under the name of "Gasavo."

The new water-works of the Shanklin (Isle of Wight) Council at Chillerton were opened last Wednesday morning by Colonel H. Gore-Browne, V.C., on behalf of Colonel Seely, the owner of the land. The supply is very abundant, though the source is eight miles from Shanklin. During the past few weeks, the yield has been over 24,000 gallons per hour; and there is a reservoir for storing 150,000 gallons The mains run through several villages, which will benefit by the new scheme.

The Newport (Isle of Wight) Corporation have consented to allow the Ryde Corporation to tap their water-main at Wootton, from which water to the extent of 150,000 to 200,000 gallons per day may be taken at 1s. per 1000 gallons, in addition to which there is an unsettled claim for 6d. per 1000 gallons by the Rural District Council for allowing the water to pass through their mains, and 2d. per 1000 gallons by Sir Charles Seely as royalty. The probable supply required by Ryde will be 100,000 gallons per day; but the arrangement may be terminated at short notice if necessary.

Mr. T. H. J. Hawkins, the Electrical Engineer at Salford, has prepared a report on this undertaking of the Corporation, which includes recommendations for the spending of £85,350 in new plant. The scheme, which involves the scrapping of the greater part of the existing plant, has created some alarm in the minds of certain members of the Council. On behalf of the Engineer, it is now explained that he had no idea of recommending that the scheme should be carried out at one time, but gradually.

A successful exhibition of gas cooking and heating appliances has been held in the Town Hall at Burton-on-Trent. In addition to the cookers, fires, &c., which were shown by Messrs. John Wright and Co., there were other features which proved highly attractive to the large audiences that assembled. Mr. Frederick Dye lectured on water heating; and Mr. Keeley (who is also connected with Messrs. John Wright and Co.) dealt with the modern gas heating-stove. Then Miss E. M. Smith gave demonstrations of paper-bag cookery. Mr. R. S. Ramsden, the Assistant-Manager of the Gas-Works, in introducing Miss Smith, said the object of the demonstrations was to show by actual experiment the comfort and ease with which either simple or elaborate meals could be cooked by gas. Subsequently it was stated that only ¾d. worth of gas had been used in 1½ hours' cooking.

At the monthly meeting of the Sowerby Bridge Urban District Council, the Clerk read a communication which he had received from the Local Government Board enclosing formal sanction to the borrowing of the following sums for the purpose of the gas undertaking: £3650 for coal-hoppers, elevators, &c.; £3370 for retort-benches, arches, gas-engine, and other fittings; £2060 for retorts; £200 for alterations to station meter-house, &c.; and £3536 for other works. This makes a total of £12,816. It was further stated that no payments should be made out of the loans to workmen in the Council's permanent employ, or to any salaried officer of the Council, except in the case of payments yearly due for legal work in connection with the object of the loans and not within the scope of the Clerk's ordinary duties as Clerk to the Council.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Sept. 16. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar, crude	per ton	—	20/- 25/6	21/- 25/-	21/- 25/6	21/- 25/-	—
Pitch	,,	42/6	40/-	40/-	40/3	39/6	39/6
Benzol, 90%	per gallon	1/-	-/10	-/9½	-/9¼	-/9¼ -/9½	-/9½
Benzol, 50-90%	,,	—	-/10	-/9	-/9	-/9	—
Toluol, 90%	,,	—	-/10 -/10½	-/9	-/10	-/10	-/10
Crude naphtha, 30%	,,	—	-/4¼	-/3⅝	-/3⅞	-/3⅛	—
Light oil, 50%	,,	—	-/3½	-/3½ -/3¾	-/3⅝	-/3⅝	—
Solvent naphtha, 90-160	,,	—	-/10 -/10½	-/10	-/10	-/10	-/11
Heavy naphtha, 90-190	,,	—	-/11	-/11	-/11¼	-/11¼	-/11
Creosote in bulk	,,	-/2¾	-/2 1/16	-/2⅛	-/2⅛	-/2⅛ -/2¼	-/1⅞
Heavy oils	,,	—	-/2⅛ -/2⅝	-/2¼	-/2⅜	-/2⅜	-/2⅜
Carbolic acid, 60's	,,	2/4	2/2	2/3	2/- 2/1	2/1 2/2	2/3
Naphthalene, crude drained salts	per ton	—	43/9	42/6	47/6	47/6 50/-	—
,, pressed	,,	—	60/-	63/-	60/-	60/- 72/6	—
,, whizzed	,,	—	—	—	70/- 72/6	65/- 75/-	62/6
Anthracene	per unit	-/2	-/1½	-/1½	-/1¼	-/1¼	—

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

STATION ENGINEER. South Metropolitan Gas Company. Applications by Sept. 30.
GAS ENGINEER (as Representative). No. 5441.
ENGINEERING DRAUGHTSMAN. Firth Blakeley, Sons, and Co., Dewsbury.
RENTAL AND GENERAL CLERK. No. 5444.

Appointments Wanted.

MANAGER (Portugal, Spain, or South America). No. 5443.

Plant, &c. (Second-Hand), for Sale.

EXHAUSTER, &c., AND TAR EXTRACTOR. J. Hawksley, Great Yarmouth.
PURIFIERS, &c. W. J. Jenkins and Co., Retford.

Meetings.

BRITISH GASLIGHT COMPANY. London Office. Sept. 27. Twelve o'clock.
GAS AND COMMERCIAL SECURITIES CORPORATION. Offices. Sept. 27. 10.30 o'clock.

Stocks and Shares.

DARTFORD GAS COMPANY. By auction. Oct. 3.
SOUTHEND WATER-WORKS COMPANY. By auction. Oct. 3.
WESTON-SUPER-MARE GASLIGHT COMPANY. By auction. Oct. 4.

TENDERS FOR

Coal and Cannel.
BATLEY CORPORATION. Tenders by Oct. 2.

Purifying Plant and House (Alterations), &c.
ISLE OF THANET GAS COMPANY. Tenders by Oct. 5.

Sulphuric Acid.
MARKET HARBOROUGH GAS-WORKS. Tenders by Sept. 25.

Tar.
MARKET HARBOROUGH GAS-WORKS. Tenders by Sept. 25.

Tar and Liquor.
BLACKPOOL GAS DEPARTMENT. Tenders by Sept. 25.
KNUTSFORD LIGHT AND WATER COMPANY. Tenders by Sept. 30.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, LONDON, E.C. "Volcanism, London."

TAR WANTED.
THOMAS HORROCKS & SONS, LTD.,
Albert Chemical Works, BRADFORD,
MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS,
CONTRACTORS, &c.
RETORT SETTINGS, COAL TESTING PLANT,
BOILER FIRING.
Communications should be addressed to
UNDERWOOD HOUSE, PAISLEY.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

BRISTOL'S RECORDING GAUGES.
THE MOST EXTENSIVE RANGE OF RECORDING INSTRUMENTS IN THE WORLD.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL, CANNON STREET,
LONDON, E.C.
Recording Pressure Gauges.
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Combination Recording Pressure and Vacuum Gauges.
Recording Draught Gauges.
Recording Hydraulic Pressure Gauges.
Recording Water Level Gauges.
Recording Thermometers.
Indicating Electric Pyrometers.
Recording Electric Pyrometers.
Recording Milli Voltmeters for stray currents in gas-mains.
Long Distance Recording Tachometers, &c., &c.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Aug. 1, p. 925.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Church Fenton, near LEEDS.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
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ANY QUANTITY. ANY PORT. ANY STATION.
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BENZOL
AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.
126, BISHOPSGATE, E.C.
Telegraphic Address: "Carburine, London."

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PREPARED from Pure Iron.
Twice as rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

SULPHURIC ACID — Specially prepared for Sulphate of AMMONIA and BENZOL Recovery Plants. JOHN NICHOLSON & SONS, LTD., Hunslet Chemical Works, LEEDS. Tele.: "NICHOLSON, LEEDS." Telephone: (Two lines), Nos. 2420 and 2421.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, SUNDERLAND, and WAKEFIELD.

WANTED—Tar and Ammoniacal Liquor. Any Quantity.
GRINDLEY AND COMPANY, LIMITED, Rawcliffe, near Goole, YORKSHIRE.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

COAL TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d. "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

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BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
"KLEENOFF," THE COOKER CLEANER.
BALE & CHURCH, LTD.,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 1588 AVENUE (3 lines).

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY,
South Kensington, London, S.W.,
INCLUDING
ROYAL COLLEGE OF SCIENCE,
ROYAL SCHOOL OF MINES, AND
CITY & GUILDS (ENGINEERING) COLLEGE.
A SPECIAL Course of Advanced Lectures as follows will begin during October next:—
Subject:
"Gaseous Fuel and Combustion,"
Conducted by
Professor W. A. BONE, D.Sc., Ph.D., F.R.S.
Particulars of this and other Courses to follow Free on Application to the Secretary.

UNIVERSITY OF MANCHESTER.
Under the Auspices of the
MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS
AND THE
MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.
A COURSE of Four Lectures will be given during the coming winter at the Victoria University on
"RADIO ACTIVITY"
"HIGH PRESSURE GAS" (2)
"GASEOUS HEATING."
Admission Free. Tickets for the Course and Full Particulars may be obtained from the Hon. Secretaries of the above Associations.
W. WHATMOUGH, Engineer and Manager, Gas-Works, HEYWOOD.
J. ALSOP, "Laymarice," Edgeley Road, STOCKPORT.

THE
Sir John Cass Technical Institute,
JEWRY STREET, ALDGATE, E.C.
Principal:
CHARLES A. KEANE, D.Sc., Ph.D., F.I.C.
The following Special Courses of Instruction will be given during the Autumn and Lent Terms, 1911-12:—
ENGINEERING METALS AND ALLOYS.
By WESLEY J. LAMBERT, Assoc.Inst.C.E.
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A Course of 24 Lectures followed by suitable practical work commencing **Thursday, October 5, 1911.**
LIQUID, GASEOUS AND SOLID FUEL.
By J. S. BRAME.
(Lecturer on Chemistry at the Royal Naval College, Greenwich.)
A Course of 20 Lectures, Monday Evenings, 7 to 8. Commencing **Monday, October, 16, 1911.**
These Courses of Instruction are arranged to meet the requirements of those engaged in Chemical and Engineering Works, or who are concerned with the use of Fuel as a Motive Power.
Detailed Syllabus of the Courses may be had upon Application at the Office of the Institute or by letter to the **Principal.**

CITY and Guilds. Mr. Cranfield's Correspondence Classes are about to resume. Instruction private, individual, and thorough. Courses and results better than ever.
Address, 11, Avondale Place, Halifax.

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We guarantee promptness with efficiency for Repairs.
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FOR Instructions on Polishing and Cleaning Gas-Cookers and Gas-Fittings, read Canning Handbook on Polishing, Electro-Plating, and Lacquering. Fully illustrated. Price 2s. 3d., post free; abroad, 2s. 6d.
W. Canning and Co., Birmingham, and 18 to 20, St. John's Square, Clerkenwell, London, E.C.

INVENTIONS.—Before protecting your idea send for free copy of our "GUIDE TO PATENTS." Full advice given on any subject—no trouble spared. Original testimonials for inspection. Highest references. Compare our inclusive fees.—WITHERS & SPOONER, Chartered Patent Agents, 323, High Holborn, London. Established 27 years.

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APPLICANTS for the above Position are THANKED, and are Informed that the APPOINTMENT HAS BEEN FILLED.

MANAGER requires Engagement. Portugal, Spain, or South America. Dividend Payer.
Address No. 5443, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE South Metropolitan Gas Company will shortly have a VACANCY at their East Greenwich Works for a STATION ENGINEER under 35 years of age. He will be required to reside on the Company's District within 2 Miles of the Works, must be a Competent Engineer with some knowledge of Chemistry, and a good Manager of men.
Commencing Salary, £800 per Annum.
Candidates must Apply, in writing only, to the undersigned not later than the 30th instant, giving year of birth, full Particulars of Career, with dates and present Position, together with Two *copies* of Testimonials.
Canvassing will disqualify.
F. M'Leod,
709, Old Kent Road, London, S.E. Secretary.
Sept. 14, 1911.

WANTED, a Gas Engineer, of Good Address, to introduce a new Process to Gas Managers. Must be a good Chemist, Energetic, and well acquainted with Gas-Works Practice. A suitable Man will be well paid.
Apply, by letter, stating Age, Experience, and when at liberty, to No. 5441, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, an Engineering Draughts- MAN, preferably familiar with Gasholders and Constructional Iron and Steel Work generally. Able to get out Quantities for Estimates and detail working Drawings.
State Age, Experience, and Salary required, in writing, to Firth Blakely, Sons, and Company, Limited, Thornhill, Dewsbury.

WANTED, for a Water and Gas Com- pany on the East Coast, a RENTAL and GENERAL CLERK.
Salary £120 per Annum, with prospect of increase to a suitable man.
Applicants must have had Experience of the work of a Water and Gas Office and be of Good Presence and Address, and not under 25 Years of age.
Apply, by letter, in own handwriting, accompanied by *copies* of Three recent Testimonials, to No. 5444, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-EXHAUSTER FOR SALE.

FOR SALE.—A Gas-Exhauster with Steam-Engine complete. Made by Messrs. Gwynne & Co., of Essex Street, Strand, in 1874, designed to pass 21,000 Cubic Feet per hour, at a speed of 100 revolutions per minute.
The Exhauster has recently been overhauled and is in good order and can be inspected at the Lowestoft Gas-Works by Appointment with Mr. Joseph Hawksley, of 2, York Road, Great Yarmouth, to whom Offers should be addressed.

FOR SALE—Two new 12 feet Square Water Lute PURIFIERS, complete with Grids, Covers, Valves, Connections, and Lid Lifting Gear. In Stock.
For further Particulars Apply to W. J. Jenkins & Co., Limited, Beehive Works, Retford.

KNUTSFORD LIGHT AND WATER COMPANY.

THE Directors invite Tenders for the Surplus TAR and AMMONIACAL LIQUOR made at the Gas-Works, Knutsford, over a period of Twelve Months ending the 30th of September, 1912.
Particulars as to Quantities and any other Information may be obtained from Mr. F. Robinson, Manager, Gas-Works, Knutsford.
Sealed Tenders, endorsed "Tar and Liquor," or separately, as the case may be, to be addressed to the undersigned and sent so as to reach him not later than Saturday, the 30th inst.
The Directors do not bind themselves to accept the highest or any Tender.
Richard R. Ashworth,
Secretary.
Church Hill, Knutsford,
Sept. 12, 1911.

ISLE OF THANET GASLIGHT AND COKE COMPANY, MARGATE.

THE Directors of the above Company invite TENDERS for carrying out certain ALTERATIONS and ADDITIONS to PURIFYING PLANT and HOUSE, with Foundations, Columns, Concrete Liquor Tank, &c., &c., at their Gas-Works, Margate, to Drawings and Specification prepared for the same by the Company's Engineer and Manager, Mr. J. M. Campbell, from whom any Preliminary Particulars may be obtained on Application.
The Site may be Inspected, and the Drawings and Specification seen and copies taken, at the Gas Company's Office, Margate (by arrangement with the Engineer), on payment of Two Guineas, which amount will be returned on the receipt of a *bonâ-fide* Tender.
Sealed Tenders are to be addressed to the Chairman, endorsed "Tender for Purifiers, &c.," and delivered at the Offices not later than Thursday, Oct. 5, 1911.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
Thos. C. Fuller,
Secretary.
Offices: Addington Street,
Margate, Sept. 9, 1911.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.
(Gas Department.)

SURPLUS TAR AND SULPHURIC ACID.

TENDERS are invited for the Surplus TAR produced, and also for the Supply of SULPHURIC ACID required, during the year ending Sept. 30, 1912.
Particulars may be obtained from the undersigned, to whom sealed Tenders, endorsed "Tender for Tar," and "Tender for Sulphuric Acid," respectively, must be delivered not later than noon on Monday the 25th inst.
Alfred T. Harris,
Manager and Secretary.
Gas Offices, Market Harborough,
Sept. 6, 1911.

BOROUGH OF BATLEY.

TENDERS FOR SCREENED GAS COAL.

THE Corporation are prepared to receive TENDERS for the Supply and Delivery at their Gas-Works of 20,000 Tons of Screened GAS COAL.
Conditions and Forms of Tender may be obtained on Application to the Manager at the Gas-Works.
Sealed Tenders, endorsed "Tender for Gas Coal," to be delivered to me on or before Monday, the 2nd of October prox.
The Corporation do not bind themselves to accept the lowest or any Tender, and may accept any Tender for a part only of the specified quantity.
By order,
J. H. Craik,
Town Clerk.
Town Hall, Batley,
Sept. 13, 1911.

COUNTY BOROUGH OF BLACKPOOL.
(Gas Department.)

THE Gas Committee are prepared to receive TENDERS for the TAR produced during the next Twelve Months, from Oct. 1, 1911, to Sept. 30, 1912.
Particulars may be had from the undersigned.
Tenders, endorsed, to be sent addressed to the Chairman, by the 25th inst.
John Chew,
Engineer and Manager.
Gas Offices, Princess Street,
Blackpool, Sept. 11, 1911.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 27th inst., at Twelve o'clock precisely, to transact the usual Business; to declare a Dividend for the Half Year ended the 30th of June last; to elect Two Directors in the place of those who go out by rotation; and to appoint Two Auditors.
Notice is Hereby also Given that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 16th inst. and RE-OPENED on the 28th inst.
By order of the Court of Directors,
A. W. Brookes,
Secretary.
Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.
Sept. 6, 1911.

GAS AND COMMERCIAL SECURITIES CORPORATION, LIMITED.

NOTICE is Hereby Given, that the SECOND ORDINARY GENERAL MEETING of the Shareholders of the above Company will be held at the Offices of the Company, 39, Lombard Street, London, E.C., on Wednesday, the 27th day of September, 1911, at 10.30 o'clock a.m., for the following purposes,—viz.:
1. To receive and consider the Directors' Report and Statement of Accounts.
2. To sanction the declaration of a Final Dividend.
3. To elect a Director.
4. To elect Auditors and to fix the amount of their Remuneration.
5. To transact any other Ordinary Business of the Company.

The TRANSFER BOOKS OF THE COMPANY WILL BE CLOSED from the 13th to the 27th day of September, both days inclusive.
Dated the 14th day of September, 1911.
By order of the Board,
W. Foreman
Secretary.
39, Lombard Street, London, E.C.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 1250 £10 NEW ORDINARY FIVE PER CENT. MAXIMUM SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 3, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
DARTFORD GAS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 3, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

GAS STOCK.

SALE OF NEW ORDINARY STOCK IN THE WESTON-SUPER-MARE GASLIGHT COMPANY.

LALONDE BROS. AND PARHAM in conjunction with C. E. MASTERS AND COMPANY, have received instructions from the Weston-super-Mare Gaslight Company, to SELL by AUCTION under the Provisions of the Weston-super-Mare Gas Act, 1901, at the ASSEMBLY ROOMS, Weston-super-Mare, on Wednesday, the 4th of October next, at 6.30 o'clock in the Evening, subject to Conditions of Sale,

£5000
NEW FIVE PER CENT. MAXIMUM ORDINARY STOCK

of and in the above-named Company, in Lots of the nominal value of £50 each.
The Stocks will be Sold and Registered in the Books of the Company free of every expense to the Purchasers thereof.
For further Particulars and Conditions of Sale Apply to Lalonde Bros. and Parham, Auctioneers, High Street, and Station Road, Weston-super-Mare, and 64, Queen's Road, Bristol; to C. E. Masters and Co., Auctioneers, 4, South Parade, Weston-super-Mare, and 12, St. Stephens Street, Bristol; to P. E. Culling, Secretary to the Weston-super-Mare Gaslight Company, or to J. H. & F. W. Bere, Solicitors, Weston-super-Mare.

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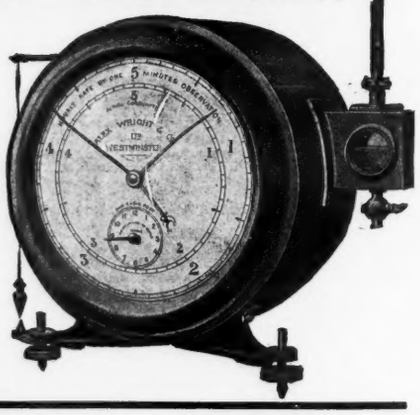

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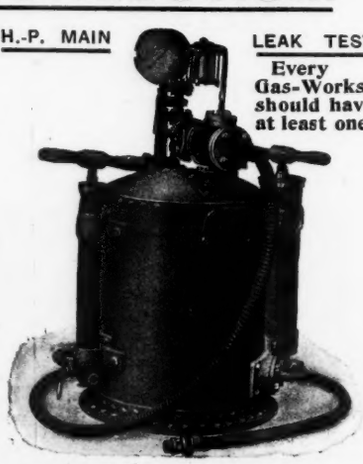
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